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AN AGENDA FOR PROGRESS

September 24-27, 1972
Cincinnati, Ohio

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Volume 2

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Preface

The National Environmental Information Symposium: An Agenda for Progress, held in Cincinnati, Ohio, on September 24-27, 1972, was attended by more than 1700 representatives of industry, government, universities, libraries, professional and trade associations, the press, and citizen action groups. The purpose of the Symposium, sponsored by the U. S. Environmental Protection Agendy (EPA), was to outline and clarify the difficulties of interchanging information in the myriad forms now available, to present the user of environmental information with a review of the services available, their location, accessibility, and cost, and to describe some of the solutions already being formulated.

The program was structured into four categories: scientific and technical; legal, legislative and regulatory; management and planning; and socioeconomic. The information services covered included information and data centers, publications, and document services and referral activities.

Interspersed in the program were a number of general sessions with key speakers, designed to set the tone for the meeting, represent various segments of producers and users at policy-making levels, and address specific issues. Two evenings were devoted to Informal Forum Sessions to permit further detailed discussion on key issues.

EPA's National Environmental Research Center in Cincinnati served as the host for the three-day Symposium.

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Introduction

The concern for environmental degradation has rapidly become an issue of public policy. The recognition of our environmental situation as a national and international problem has created a demand for a large variety of information and data to more clearly define the problem and aid in its solution. The widespread interest in this growing field has resulted in the development of myriad sources of information which vary in type, quantity, frequency and reliability, as well as means of access. It is safe to say that even those who have spent their entire careers in environmental pursuits are not totally aware of all sources of environmental information. The National Environmental Information Symposium was planned to provide a forum from which the existing sources could be studied and examined from the point of view of user communities across the length and breadth of society. The Symposium does not represent an end to our search for environmental information; on the contrary, it represents the beginning of what one hopes might be the dissemination of knowledge and skills necessary to access the total body of environmental information available today. It is my feeling that those who carried the burden of describing the existing systems as well as those who commented upon their utility met the charge given by Administrator Ruckelshaus at the opening of the Symposium. There now remains the more substantive task of cooperatively developing some system by which we can effectively retrieve and use the overwhelming bodies of information we have collectively produced and which stand on the threshold of availability and usefulness.

Andrew W. Breidenbach, Ph.D.
Director, National Environmental
Research Center, Cincinnati

GENERAL SESSION ADDRESSES

THE CONQUEST OF THE OVERLOAD

William D. Ruckelshaus
Administrator
U. S. Environmental Protection Agency

One of the most characteristic activities of 20th Century man has been his relentless drive to master the natural world. But what he understood as conquest was often mindless intervention resulting in undesirable change. The world environment is in bad shape, and notwithstanding certain local improvements is probably getting worse.

We may, indeed, as one scientist has suggested, already have a substantial part of the scientific information we need to ensure the protection and preservation of our common environment. Yet we don't have timely access to it because retrieval systems are uncoordinated or non-existent. There is as great a need to organize and manage information as there is to make new discoveries.

After some digging I found out a few weeks ago that environmental information is generated by some 75 different sources in the Federal Government alone. More than a dozen Federal agencies play some role in collecting and disseminating this information. Within EPA we have identified a number of separate information systems.

Many of you have had frustrating first-hand experience with this problem in industry, in academic life, in the media, and in government, and the present conference should provide ample opportunity to wrestle with it. I look forward to the day, hopefully not too far distant, when all the research on any subject--and all relevant administrative information--is instantly available to those who need it. Our present repositories are hopelessly obsolete for the job they have to do.

The time and effort which must be expended to get out the necessary data are often so great, I'm told, that scientists must proceed without them. Occasionally, valid experiments are needlessly repeated because investigators had no knowledge of prior work. For management, the lack of data can retard project timetables, render economic forecasting hazardous, mislead us on labor market conditions and present obstacles to timely investment. Not having information on hand about the social impact of government or private programs can seriously disrupt communities. We simply can't afford this kind of waste and confusion. Not when life itself may depend upon the progress and swift dissemination of the findings of science. That is why this symposium is of historic importance. It is one of the first efforts of its kind in any discipline.

In the course of your deliberations you must lay the foundations for a continuous dialog between the producers and managers of environmental data and their fast growing clienteles. You must make it easy for activists, trade associations, professional societies and government agencies to analyze the common denominators of their needs as they relate to the user complex as a whole. You must help reporters get their stories so they can build public consciousness of costs and benefits.

I personally will look forward to your comprehensive report, which I hope will give due consideration to the kind of National Referral Center recommended at the Stockholm Conference. From my point of view as Administrator of EPA, the benefits of a broader base of usable information would be dramatic.

We would gain a much sharper picture of the impact of pollutants on biosystems. We could monitor both short and long-term trends and take remedial action before a problem became too intractable. We could develop a more sophisticated index of the true costs and benefits of pollution control. And we might even speed the evolution of a new philosophy of environmental stewardship if we could show the connection between our ideology and rampant pollution, congestion, ugliness, and decay.

As it is, we are sometimes compelled to work in the dark. We are often forced to take action on the basis of inadequate information and we seldom have clear-cut options. If we were better able to predict the consequences of our actions, many actions might never be undertaken at all. We could abandon technological determinism--the doctrine that we must do whatever we can do--in favor of consciously deciding our own fate and the structure of society.

When that happens, the undercurrent of hostility to impersonal science will fade away. Scientific knowledge, now suspect, can become a benison which directs and controls all other resources. Such knowledge is undoubtedly the most concentrated form of wealth, the most enduring, the most marketable. It may in time completely transform our conventional choices--limiting some, vastly expanding others, and making mere things obsolete as indices of personal and social well-being.

At the same time, there are dangers. Information with a high operational payoff will reinforce the power of managerial elites. It will tend to broaden the gulf between those who command the new technology and those who cannot. So information technology is potentially anti-democratic.

Moreover, it is in the nature of vested interests--government, business, labor, education--to try to control access to information that might thwart their purposes. Without careful safeguards, data retrieval could become a force for monopoly or special privilege and in the hands of a tyrant, a weapon to control and coerce. The information in scientific data banks should therefore be open to all.

It is equally vital that government decision-making processes be open to the people. I am convinced that if an environmental decision is to be credible with the public it must be made in the full glare of the limelight. It won't work for me to call a conference, announce a complicated and far-reaching decision, and let the public figure out later what has happened. We must lay our evidence on the table where it may be cross-examined by the technically informed and the public alike.

But in order to make wise decisions, I need your help as scientists, academicians, businessmen, journalists, and information managers. I need the very best evidence and judgments that you can give me. This is a contribution that you are particularly equipped to make.

I fully understand the specialist's desire to seek a quite spot to contemplate and carefully work out rational solutions. I sympathize with his distaste of the hysteria that sometimes accompanies public discussion of environmental issues. However, the demands of an open society will not permit the luxury of withdrawal. Our obligation is to make a public accounting--to explain why we have taken or refused to take certain actions. You must participate in this process of public education if it is to succeed.

This means that scientists, computer men and information managers will have to be more active in the public forum, laying out the facts and helping to formulate and clarify issues. When complex questions confound the layman there is no substitute for reliable evidence and sound advice. No one opinion can expect to dominate the formation of policy, but sound policy-making is impossible without a thorough exposition of all relevant facts and views. You may, therefore, be confident of your role in our society. You are helping to assure a future that is prosperous, safe, clean, comfortable, healthy and humane.

The image of the disinterested professional breaking down the barriers of ignorance, wiping out misconceptions, discovering new facts, laying the foundations for knowledge, prosperity, progress and peace--this image has been enormously influential and persuasive as a model of stewardship. It will continue to be if we treat technology as a means, and never as a goal in itself.

Today, information technology provides us with a potential for formulating and ordering our priorities from the small community to the world as a whole. It can greatly augment managerial decision-making. It can liberate us from ignorance and enable us to develop more depth as individuals. It can narrow the gap between the haves and have-nots. It can facilitate cooperation for peace. But unless our information technology, from commom language down to the newest computer, is used wisely we will not be able to make policy effectively and we will surely lose public support for science.

For a long time the benefits of science were accepted more or less without question. But in recent years there has been a change in our thinking. People no longer want benefits without being informed of the dangers. They realize that inherent in the use of nuclear electricity to provide air conditioning is an implicit acceptance of the hazards of radiation and thermal discharge. They realize that having cheap and plentiful food means putting up with some crop chemicals whose safety can never be proven absolutely. They know that having a car means tolerating the problems that go with the convenience.

Until recently, it seemed there was nothing we could not do. Now we are repeatedly and most cogently reminded that we depend on living processes for survival--processes we only dimly understand and cannot supplant. The conclusion is inescapable that from now on our applications of technology will be monitored, subjected to critical review, and modified in advance to meet social requirements. This does not mean we should discontinue or even slow the development of new technology, rather that we need to better understand its social and environmental impact. In the long run, this will be less expensive than having to undo our mistakes after the fact.

The most important objective for the future of information technology, therefore, is to place this rapidly evolving discipline in its proper relationship with man so that it can serve him and not control him. It could bring us to the threshold of a new kind of civilization. Whether we cross it and take the next step in the endless evolution of mankind toward reason and serenity remains to be seen. The choice, however, is with us--not with our machines.

When historians of the future look back on this period, they will say it was an age of enlightenment when man first understood that his limitless capacity to innovate always takes place within nature, not outside it, and that maintaining the life systems of the earth is our most sacred task. It is a time of adjustment--even for the best educated. But who is better equipped for the life of creative adaptation than yourselves?

With science integrated into the total culture of mankind, I have no fear for the future. Man will not only survive, but prosper, and advance in wisdom as a guardian of the earth.

John W. Townsend, Jr.
Associate Administrator
National Oceanic and Atmospheric Administration
U. S. Department of Commerce

Mr. Chairman:

Two years ago President Nixon's Reorganization Plans 3 and 4 (of 1970) created the Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA). In his message forwarding the plans to Congress, Mr. Nixon said:

> "I expect it (NOAA) to maintain continuing and close liaison with the new Environmental Protection Agency and the Council on Environmental Quality as part of an effort to ensure that environmental questions are dealt with in their totality and that they benefit from the full range of the government's technical and human resources." 1/

The formation of EPA, NOAA, and the Council on Environmental Quality illustrate our nation's concern for the quality of our air, land, and water, and our nation's intent to improve, protect, and manage the fragile, complex ecosystem we call our environment.

Although I could cite many, many examples of environmental problem areas currently receiving national attention. I shall mention only the Coastal Zone.

The Coastal Zone is a limited border between the two major components of the earth's surface: land and water. It is rich in resources, from grains and minerals to ducks, fish, and oysters. It is the scene of constant human activity for both business and pleasure. Although few people realize it, more than 50% of the population of the United States lives in countries bordering the ocean and the great lakes: by the year 2000 it is estimated that 200 million people may live in the coastal zone of the United States.

1/ Press Release, White House, July 9, 1970.

Unfortunately, the coastal zone is also the recipient of much of man's pollution. It is a fragile interface in many ways, and requires careful, intelligent long-range development and management. [2]

To effectively carry out the necessary research, development, survey, monitoring, and related activities, money is needed--and is being made available. The Office of Management and Budget estimated that in fiscal year 1971 the federal government spent $810 million in a variety of programs designed to analyze, describe, predict and protect the environment. The breakdown includes $40 million for pollution monitoring and surveillance, $417 million for operational activities, $128 million in research and development to observe and predict weather and ocean conditions, $124 million for weather modification research and development, and the remainder for ecological and other basic environmental research. [3]

These activities describe in part the complementary missions of NOAA and EPA. Related NOAA functions include monitoring and predicting the characteristics and changes of the atmosphere, ocean, sun and solid earth. Primarily related functions of EPA are to assure the protection of the environment by abating and controlling pollution on a systematic basis. [4] Environmental data and information are the key to success in both missions. For, as Mr. Ruckelshaus has pointed out, scientific knowledge is "The resource which controls every other resource," and "The most concentrated form of wealth."

Environmental data are essential to assess the "quality" of the environment, to document its long-term trends, and to conserve its resources for future generations. Where possible, contamination of air and water must be reversed or at least regulated; but specific decisions must be made rationally--on the basis of documentation of the problem.

Essentially, this means the assembling and assessing of environmental observations by EPA, NOAA, CEQ, and other Federal, state and local agencies--as well as by international organizations--to describe and monitor the character of our physical environment and to plan programs to preserve its quality and conserve its resources.

2/ Pre-pub Summary, C.Z. Workshop, Institute of Ecology, Whoi.

3/ Senate Report 92-945, 92nd Congress.

4/ U. S. Government Organization Manual 1971/1972.

The interrelated functions and activities of the many multidisciplinary organizations and agencies involved--as well as those of other groups in the private sector with similar or related programs--could easily result in confusion, chaos, and duplication of effort in the collection, processing, and dissemination of environmental data and information. This must not happen. Not only must NOAA's and EPA's data-related activities be coordinated, but also those of federal bodies such as the Office of Emergency Preparedness; Office of Science and Technology; Department of Health, Education and Welfare; Department of the Interior, Department of Defense; Atomic Energy Commission; and Department of Transportation; as well as those of state and local agencies, of industry, academia, and even--to the degree practicable--those of the international community.

This obviously is an enormous undertaking. Yet it is clearly our duty to insure that our essential--and limited-- environmental data resources be employed to assure the maximum benefit possible. Environmental data and information must be readily and economically available to all users on a timely basis.

To quote the National Council on Marine Resources and Engineering Development (referring to oceanographic data):

> "The potential of this information does not necessarily lie in the quantity of material collected but in the efficient use and integration of high quality, reliable data for whatever requirement it fulfills for the data using community."

As one example of this, I would point out that approximately 90% of the users of NOAA's data services and products are non NOAA users--the national and international scientific community, other government agencies, industry, commerce, and the general public.

Given the awesome volume and myriad diversity of environmental data being collected, we increasingly require--and NOAA is actively participanting in the development of--a coordinated, national environmental data and information system. This is essential if we are to minimize duplication and--of even greater importance--provide users with the types of environmental data and information they need, when they need it, in the forms and formats they require.

Such a system should be designed around existing data and information centers and systems, with new centers to be added only as appropriate. It should function primarily as a data referral and coordinating activity. Insofar as resources and the state of the art permit, the centers should be linked in an interactive mode, eventually leading to a computer-to-computer query and reply capability. Note that this concept precludes consideration of the monolithic data center.

In its own areas of responsibility, NOAA is already moving in the direction of a system of centers. Last fiscal year our environmental data service responded to nearly 50,000 multidiscipline requests for environmental data and information, drawing from our Oceanographic (Washington), Climatological (Asheville), and Geophysical and Solar Terrestrial (Boulder) Data Centers; from our developing Great Lakes Center (presently organizationally within our National Oceanographic Data Center) and from our Literature-Related Environmental Science Information Center (Washington) and its several technical libraries. In addition, under an agreement with the National Academy of Sciences, NOAA also has responsibility for a complex of 5 (of 8) World Data Center activities. The World Data Center system was established in 1957 by the International Council of Scientific Unions (ICSU), to inventory and disseminate data for the international user community during the International Geophysical Year (IGY). By international agreement, the resulting network of data centers has been continued on a permanent basis. WDC-A is located in the United States, WDC-B in the U.S.S.R., and WDC-C in Australia, Japan, and various countries of Western Europe.

The NOAA System of Environmental Data and Information Centers coordinates its activities with similar federal systems in the Environmental Protection Agency; Department of Interior (Bureau of Sport Fisheries and Wildlife and U.S. Geological Survey); Department of Transportation; Department of Defense (Navoceano, Office of Naval Research, Air Weather Service, Naval Weather Service); National Science Foundation (IDOE); and with a number of related state, industrial, and academic activities.

The recent 114-Nation UN Conference on the Human Environment held in Stockholm urged the "Establishment of an international referral service for efficient...exchange of information on environmental problems and solutions..." The need for environmental referral services is no less critical at the national, regional, or local level. To meet such needs, NOAA has, since 1969, been building an Environmental Data Index or "Endex." When fully operational (target date, 1978), Endex will provide convenient, rapid referral to existing NOAA, national, and global environmental science data files and sources, as well as documentation concerning their quality, quantity, and character. A complementary, literature based system, OASIS (Oceanic and Atmospheric Scientific Information System), will provide a paralled subject-author-abstract referral service.

Since our holdings contain only a portion of the total body of environmental data and information necessary to develop Endex, we must seek our and document collections scattered through many federal, state, and local agencies and institutions. In some agencies, such as EPA and the Geological Survey, automated reference systems to major bodies of environmental data already exist or are planned. Through the cooperative development of inter-agency linkages, NOAA hopes to mutually expand the reference services of these agencies, as well as NOAA's Endex, to achieve a coordinated coverage of all aspects of the environment, without costly duplication of effort.

A cooperative pilot project is already underway in this regard. NOAA's reference files for oceanographic data, meteorological data, and technical literature for the New York Bight area have been loaded into the Information Retrieval System of EPA's Water Quality Office. This interaction was undertaken to enhance the exchange of oceanic and coastal zone marine pollution data so as to advance the missions of both agencies.

The Environmental Data and Information Centers and services of NOAA and EPA--indeed, of all federal agencies--exist to serve the user community, both individually and collectively. They must, however, depend upon you, the user, to advise them as to what specific data you need; how many observations are required (in space and time); what forms and formats are most useful for your applications; and what relative currency (in time) is required for the data and information requested. Essentially, we need user guidelines to identify those data which should be processed for high speed, flexible retrieval, and those which are most useful in published summary form, with the raw data stored in low-cost, microform media.

It is an economic and political fact of life that no data or information center or system can be all things to all users. It should, however, be as responsive as resources permit. Although the primary objective of this symposium is to provide the opportunity for you, the users of environmental data and information, to learn exactly what data and information are available, where they are located, and how to get them, we also hope to benefit from your input and feedback. The symposium committee will develop a summary report distilling your recommendations into "action items" that both the government and private sector can act upon to improve their environmental data and information products and services. In addition, we seek your recommendations as to whether this symposium should be but the first of a series and, if so, solicit suggestions as to topics for and ideas to improve on the organization of the plenary and working sessions of future symposia.

With these goals in mind, may I now urge you to study the symposium program carefully and to participate in as many sessions as may be of interest to you. We sincerely hope that each of you will go home with a better working knowledge of what environmental data and information are available to you and how to get them; in turn, we hope to learn a lot more about your specific problems and needs. We thank you for both your participation and your contributions.

TECHNICAL INFORMATION PROGRAMS
IN THE
ENVIRONMENTAL PROTECTION AGENCY

A. C. Trakowski
Deputy Assistant Administrator for
Program Operations
Office of Research and Monitoring
Environmental Protection Agency

Good afternoon, ladies and gentlemen. I am most pleased to be here today to say something about environmental technical information services and in particular those of the Environmental Protection Agency. To begin with, I must tell you that I am a substitute. Dr. Stanley Greenfield, my boss, and EPA's Assistant Administrator for Research and Monitoring, was scheduled for this luncheon talk, but, unfortunately, he recently suffered a severe break of his upper thigh-bone and is now somewhat incapacitated, but recovering very well. Stan has asked me to convey his most sincere best wishes for a highly successful meeting here, and express his regrets that he can't be present. I'm always proud to act in his place, and hope that I can at least partially project his enormous enthusiasm and understanding.

Before we go on, I must express my appreciation for the great turn-out for this symposium. We're enormously pleased that so many people want to know where its at, informationally speaking, of course.

Todays topic is environmental information and data systems. Somehow it has become fashionable to speak of these two concepts as though they were one and synonymous. Although there is overlap and mutual dependency between data and information, the systems for handling them are not the same, or necessarily even compatible, and they do not necessarily serve the same purposes or users. I've been involved in the design and operation of both types of systems, and I'm conscious of the similarities and differences. Your deliberations at this meeting in the working sessions this afternoon should address the problems that both separate and connect environmental data and information systems and their users. But for this moment, let me talk about both, and how we in EPA see them. Let me say a little about what's going on in EPA.

We are all too aware that the products of our activity, our research, our technological development and our surveillance of the environment are data and information. The usefulness and value of these products depend upon their timely availability to the using public. The complexity of the environmental problems facing us today requires the best possible generation, coordination, and dissemination of our data and information, and we are well aware that the management and use of environmental data and information must be improved.

The formation of EPA and the experiences of the past twenty months of operation have re-emphasized the interrelatedness of our environmental problems. The many factors of this complexity are directly transposed into the data and information that must be handled and used to serve our national needs. Let me mention a few of these problem factors.

First, the volume alone of environmental data and information is growing at a staggering rate. There are now some 47 different federal programs producing or serving as outlets for information on air pollution alone.

Second, is the interdisciplinary nature of this information. As we all know, our environmental problems have to be solved as total problems, in which all the pollutants and the total ecology of a domain are considered. We must deal with many technical disciplines such as physics, biology, chemistry, medicine, all branches of engineering, and mathematics. We must also consider the fields of psychology, sociology, management, urban planning, economics, and law, to name a few. The solution to any environmental problem centers on no one discipline, it involves many. And any solution is usually not unique, but is among several alternatives, each involving a different set of disciplinary components.

A third kind of problem we face with our environmental data and information is that there are a variety of kinds of people who need to use this information. The information must support the scientists and technologists in agencies at the federal, state, and municipal levels, in academia and in private industry. Also needing information are the managers and program operatives of these organizations, legislators, and concerned citizen and the press, and all sorts of non-technical people who need to act on scientific and technical information.

A fourth problem we have with our environmental data and information is that it can be found almost anywhere. Environmental information is not unique to agencies having missions in environmental matters. Information in other organizations useful to environmental problems must be identified and shared. Without knowledge of what is available in other systems, duplicative and overlapping environmental information systems tend to spring up. Often the managers of existing centers and proponents of new centers do not know that systems and data banks that can serve their needs exist elsewhere.

We are aware that the forces demanding environmental data and information are very strong. We are also aware of the feelings of frustration in people who cannot seem to gain the material they so sorely need. We are aware that these feelings tend to generate disregard of the systems that exist as unresponsive, and support movement toward a new and omnibus central system that will totally serve all needs. One vision seems to be a cubic mile of computers in Kansas into which all environmental information from anywhere is put, and from which all environmental information to anywhere can be sent instantly, in any combination and for any purpose.

At EPA we observe that in our own Agency and throught the nation we are already heavily invested in on-going and rapidly developing information and data systems that contain environmental material. We also see that it is their separation and uncoordinated functioning that frustrates the users. Unless a user knows which system contains what he wants, it is unlikely that he will find it.

Our alternative to a new cubic mile of computers is to extract maximum utility from the systems that we already have, and reserve development of new systems only for functions that cannot be handled by adaptation or extension of existing systems. Our vision then is the development of a system of systems such that material anywhere in the component system can be retrieved through use of an integrating and interactive network. This network cannot be built in a day. It must evolve as the component information systems, each needed for some specific purpose, are improved, and as the most effective relationships among these systems are found.

The first step is to determine the requirements of that network and the functions of the individual systems of which our network will be composed. We must ask ourselves what information and data we must have to fulfill our many needs.

When setting up the EPA the President said:

> "Both by itself and together with other agencies, the EPA would monitor the conditions of the environment -- biological as well as physical. With these data, the EPA would be able to establish quantitative "environmental baselines" -- critical if we are to measure adqually the success or failure of our pollution abatement efforts."

Following this guidance, one of our first steps in building our information network at EPA is a study which has three major purposes:

One, identifying national requirements for environmental pollution data;

Two, comparing these requirements with data collection activities and resources already available within EPA and other Federal agencies; and

Three, identifying those requirements for environmental pollution data which are not being satisfied and which should have higher priority for the commitment of new resources.

Once this study is completed, we will be in a position to design whatever systems are needed to coordinate and improve the utilization of environmental data. We will look at the feasibility of integrating monitoring subsystems among the various media.

Under the reorganization plan which created EPA, the environmental programs of several agencies were consolidated into EPA. Resulting from this consolidation were the inherited problems of compartmentalization, fragmentation, and duplication. We have had to harmonize these different elements, among them the area of information resources. Over 50 separate information facilities -- libraries and information centers -- were passed on to EPA. Supporting these information facilities was a wide range of data handling equipment, and computer hardware and software packages.

To resolve this confusion, our agency, in 1971 formed an Information Systems Committee. The group is composed of personnel from EPA Headquarters, EPA's 10 regional offices, and EPA's laboratories through out the country. Its objectives are: (1) to identify gaps in meeting the information needs of EPA managers and program operators; (2) to identify possibly overlaps and duplications in the existing systems and data bases; (3) to identify systems training and orientation needs at all levels of EPA management and operations; (4) to develop standard data elements and codes for common-use items of information, and (5) to recommend Agency-wide information management policies and programs.

We are at work conducting a comprehensive inventory of EPA information systems. The results will be used for research, analytic, and reference purposes. It will include the production of a dictionary of systems; construction of a profile of the kind of information currently available and proposed to be available; and determination of how current systems may be used analytically as interactive tools for research in addition to the library mode of use.

We are also making a survey of EPA computer equipment and facility needs to determine how best to optimize equipment utility and physical location with information system needs.

In addition, EPA Information Centers have been identified and steps have been taken to strengthen the links among these facilities.

I could not possibly describe to you the status of all of EPA's current data and information systems within the time I have here today. However, I would like to give you a quick overview of our present capabilities in 10 different areas. If you are interested in more detail about these or other capabilities, I understand they will be the subject of informal forum sessions tonight.

First, our Office of Public Affairs. This office provides cohesive public information services and support to Agency programs and operations. It develops public information including publications, audiovisual materials, and exhibits. Special attention is given to schools, youth groups, civic action groups, and private citizens.

Second, our EPA Library System. It consists of some 37 libraries. There are libraries at headquarters, in all regional offices except Denver and Atlanta,at each of our four National Environmental Research Centers, and specialized information centers in satellite laboratories and program offices. The collections of any of these libraries are available to the EPA staff at any location.

The National Environmental Research Center here in Cincinnati is the central technical focal point for the Agency library system for cataloging all scientific and technical books for the Agency.

Other libraries in the National Environmental Research Centers, Regional Offices, and laboratories serve as liaison for the system with university, State and local government, private organizations, environmental libraries, and publishing offices in their locations, in order to provide EPA with the broadest possible coverage of all environmental information.

Our computer generated Journal Holdings Report includes all journals received by any library in the system, and the computer generated Book Holdings file will permit immediate cataloging of any items already in the system. Bibliographies resulting from computer literature searches or manual methods will be available through normal distribution channels and the Department of Commerce's National Technical Information Service.

Third, our information systems in the area of air pollution control. EPA, since 1967, has accumulated over 20 million air quality (Storage and Retrieval of Aerometric Data) data values and 6 million sources inventory and emissions data values. The data bases (National Emission Data System) are expanding at the rate of several millions of values per year. These values come from internal EPA sources, state, local, and other Federal agencies, the World Health Organization, the World Meteorological Organization and from non-government groups. Currently, the system is accessible only by EPA's National Air Data Branch, but remote terminal access from the EPA Regional Offices is being initiated.

Our Air Pollution Technical Information Center (APTIC), in North Carolina now has records on over 43,000 documents, with an increase of 700 to 1,000 per month. The sources of the documents referenced by the system include EPA air pollution manuscripts, government reports, more than 1,100 domestic and foreign serial publications, patents, technical society papers, dissertations, translations, and articles from books and proceedings. With this record base, APTIC conducts literature searches which result in abstracts from the complete file and from the latest month's additions, to produce Air Pollution Abstracts, a monthly publication sold by the Government Printing Office (GPO), and to produce bibliographies and state-of-the-art summaries for printing and sale by GPO.

In the future, APTIC hopes to provide access to EPA's regional offices and to state and local air pollution control agencies by remote terminals.

The fourth information system I would like to discuss is in the area of water pollution. STORET, a system initiated in 1963, is the central computer-oriented segment of EPA's National Water Quality Surveillance and Information System for storing and retrieving data and information on water quality; water quality standards; pollution-caused fish kills; man-power and training needs; municipal and industrial waste discharges; and waste abatement needs, costs and implementation schedules.

There are presently 42 federal terminals throughout the country for on-line access to STORET. Twenty states also have terminals. EPA is encouraging the use of this system by other federal, state and local agencies. Adding users to the STORET system will reduce duplication of information gathering efforts, and gain the use of data and information gathered by those agencies at much lower cost than would be possible otherwise.

The material in STORET is necessary to EPA management decisions such as definition of pollution problem areas, prioritized allocation of Agency efforts toward abatement and control, determination of trends in water quality control programs, identification of specific polluting waste water courses, and municipal waste treatment facility construction needs.

The system also supports technical and scientific studies. For example, a large field study may result in thousands of data values. STORET can perform the function of a filing and classifying system and a data statistical analysis and evaluation system.

In addition to STORET, dissemination of water quality information is provided by the Water Resources Scientific Information Center (WRSIC) of the Department of the Interior under a cooperative arrangement. EPA supports eight "centers of competence," largely at universities, which produce indexed abstracts in their respective fields. These are then published by WRSIC as part of Selected Water Resources Abstracts.

The fifth information capability I want to mention is in the area of pesticides. We are publishing two key periodicals here. One is the Health Aspects of Pesticides Abstract Bulletin. The other is the Pesticides Monitoring Journal, an interdepartmental publication.

A combined effort of the Toxicology Information Program of the National Library of Medicine, the Food and Drug Administration, and EPA's Division of Pesticide Community Studies, which publishes the abstract I just mentioned, has produced a generalized on-line storage and retrieval system, TOXICON. It accepts abstracts and data coming from the various contributing programs in a standardized format. I understand that TOXICON is now available to the public, with access to the system by remote terminals.

Sixth, in the area of solid waste management, EPA offers the only known specialized literature coverage of the solid waste field. Our Solid Waste Information Retrieval System (SWIRS) covers the published information concerning current research and technological developments in the solid waste management field world-wide. Computerization of the record base of approximately 18,000 references has been completed. SWIRS also provides a bulletin of condensed abstracts of current acquisitions, which is published bi-monthly.

Seventh is the EPA Office of Research and Monitoring's information system. We have established a new service called ENVIRON, which stands for Environmental Information Retrieval On-Line. ENVIRON is an on-line, interactive information retrieval system.

ENVIRON is oriented towards information retrieval problems which are characterized by difficult and vague subject definition, extensive variance in term selection, changing scientific and technical terminology, and imprecise search definition. Other government agencies, such as The National Library of Medicine and NASA, have adopted the same computer software included in ENVIRON. The use of this common software could obviously improve the intergovernmental exchange of environmental information in several ways.

As I said before, ENVIRON is a new system. So far, six files have been installed in the system.

(1) EPA On-going Research Projects. This system will describe all currently active EPA research and development projects, whether in-house or by contract, grant or interagency agreement arrangement.

(2) Technical Assistance Data. This is a file of data on oil and hazardous materials to provide quick access to technical information on the hazardous compounds for technical assistance to pollution problems.

(3) Oil and Hazardous Materials Incidence. This file covers information on oil and hazardous materials pollution events, including details of their locations and recovery activities.

(4) Water Quality Surveillance Network directory of all STORET sampling stations, where they are and what they measure.

(5) Industrial Waste Abstracts, a file of selected articles and abstracts from industrial waste publications.

(6) EPA final research reports, a file of reports produced from EPA research and development project efforts.

The eighth information capability I want to talk about is in a new part of our Office of Research and Monitoring. Technology Transfer, as this function is called, is concerned with active transfer of the methods and techniques resulting from EPA's research and development to practical use by the public.

Our Technology Transfer program has several vehicles for getting information to users. Most important, it has so far developed four process design manuals for design engineers which describe the state-of-the-art in water pollution control technology. These loose-leaf manuals wrap-up EPA in-house, contract and grant research; other Federal research;

other governmental research; and private industry research, into a format and content suitable for use by municipal, state, and private consulting engineers. The current design manuals have been distributed widely through the engineering community. The Technology Transfer program is now expanding into all areas of pollution control. First among these new areas will be air pollution and solid waste. Also, to communicate new technologies to state and local government decision makers, Technology Transfer has prepared a number of semi- or non-technical publications.

The ninth information system of EPA which should be mentioned is our new technical information system for noise. The Noise Information Service (NOISE) will contain initially citations and abstracts of various publications. These records are directly accessible from a remote computer terminal. In the future, files on such areas as noise research and noise programs may be created. This system uses the same software package used by ENVIRON, the record base will soon become a part of ENVIRON, and it will be accessible to the public through EPA's Office of Noise Abatement and Control or through its Regional Offices.

And now the tenth and last area of information capability which I would like to mention. The National Environmental Policy Act of 1969 (NEPA) requires all Federal agencies to assess the environmental impact of their programs and the activities that they support, and file and Environmental Impact Statement. EPA is one of the major commenting agencies on these statements. To manage its Environmental Impact Statement review process, EPA maintains in a central computer system a continuing record of the content and action on statements being reviewed. Inquiries can be made on federal projects that are expected to effect the environment and on what those effects may be. (Office of Federal Activities)

We have a long road ahead of us in improving and integrating these capabilities, but I think we have made very substantial progress. Of course, our system integration will also include attachments to information systems outside of EPA.

In closing I would like to point out that this symposium is of great importance to us in EPA. The scheduling of EPA efforts for development of a network of environmental information systems has been arranged so that we might take advantage of the results of this symposium as part of our decision-making processes. EPA must consider carefully the views of the users of environmental information before making long-term commitments. These commitments will include establishing integrated information facilities, purchasing computer and telecommunications equipment to process and transmit data and information, and establishing methods to insure that stored documents and items of data are properly correlated, indexed, easily retrievable and effectively presented. We hope you will use this symposium to let us know what you think and what you need. We believe our data and information systems must serve not only our agency, but must also serve you.

Thank you very much.

Honorable Richard G. Lugar
Mayor of Indianapolis

Thank you very much, Mr. Chairman.

Ladies and Gentlemen:

The information that I want to provide this morning and likewise that I want to seek may differ slightly in character from some of the other requests that you've had, but it seems to me to be important at the outset of these remarks from the standpoint of a city administrator and one active in partisan politics to indicate that there are very considerable difficulties which you have perceived and which I perceive each day in thinking through environmental considerations and policies and implementing these, given the challenges and also the difficulties of the American Federal system. Now, this is a system with which you have wrestled as political scientists quite apart from work you may have done in the physical sciences, but it's a system that needs to be understood well if in fact a comprehensive environmental program is to be successful in the United States of America. To oversimplify the dilemma at the outset let me say this . . . that it is not easy for those at EPA or those who give power to EPA from Congress and the national administration to set environmental standards. Certainly the research and thoughtfulness, the degree of compromise involved in setting of these standards is enormous. It is not easy for these standards to be encouraged upon state governments, who may then set standards and attempt to work at that level. It is even more difficult, I suspect, for those standards to filter to local governments. But the basic dilemma, as I see it, of much of what we are looking at presently is the fact that at the national level there is a desire to set standards with regard to air and water pollution and there is a desire to make certain that these occur in terms of compliance throughout the country. But the problem with the environmental aspects as with many other standards being set, whether they be educational or medical or transportation or with regard to economic poverty in this country, is that it is a great deal easier to set standards than it is to deliver the goods at the delivery end of the American Federal system. And the dilemma which I have and which I share with many other mayors, city managers, councilmen, and those in charge of local affairs is that we are on the delivery end of the system. Ultimately, to take a very parochial case of Indianapolis, Indiana, the White River, which goes through our city, will either have a degree of purity or it will not, dependent upon the efforts of the people in our city. And one of the basic problems which we will have is not necessarily defining the purity of White River, but in finding both the money and the expertise to do the job. Both are in short supply presently, and therefore the results of the Institute's work in Cincinnati and in four other centers elsewhere throughout the country is of the essence in giving us the technical expertise and hopefully legislation that is both compassionate and thorough with regard to the local problem and be helpful in the second instance. But both will be required. It is simplicity to suggest that in the event that Indianapolis, for instance, really wanted to get on with the job and really had a passion for environmental causes, the White River might be cleared on the basis of our own technological or economic resources. Such, in my judgment, simply is not the case, for several reasons. One again reducing things to simplistic aspects for sake of time, there are at least three major problems in cleaning up White River. They include the fact that a tertiary treatment system will be required and we have secondary treatment presently which we are told brings about roughly 92 per cent purity more or less. If 97, or 98 or 99 per cent is required a third treatment system must be placed there. Now there are some in America who are confident that they know precisely what sort of a system ought to be placed at the Southwest Treatment Plant. But most people in America are not very confident that they know precisely what ought to be placed there, nor the price tag that ought to be placed upon it. I think there is more confidence that given 1975 or 1976 or 1977 the state of the art may give us a great deal more confidence in terms of our investment. And therefore a timetable ought to be set that recognize that people are hard at work and are finding a great many things. And on occasion a bold expert will come to our city and claim that he knows how it can be done. But this is an extraordinary happening. By and large people are more modest intheir claims and suggest that in all probability certain things will follow. Now the reasons for this modesty are not only a lack of technological expertise but also the history of our city -- 480 miles of combined sanitary and storm sewers which undergird Indianapolis. We are not unique in this respect. Most cities of Indiana, and for that matter, most cities of the middle west prior to 1960, these systems were built together as opposed to being separated. The result is that when an inch of rain falls, hits Indianapolis and Marion County, two billion gallons of water gravitates to White River. 350 million gallons can be treated in our secondary treatment plant. The other one billion 650 million gallons cannot. It misses and hits White River through various tributaries and runoffs. In short, we have a problem not in common with many areas of how to impound water for sufficient periods of time to run it through a treatment system, either secondary or tertiary. We have at the present time no caves, caverns or any sort of receptacle in which to hold the water, and it has been suggested by some who are not sympathetic with our cause if we did not allow it to run down it would run up through people's toilets and sinks and into their houses with disastrous consequences. So they are wanting it to go down, although the counts in White River during this situation rise to precipitous levels as regards standards. Now a third problem is of course that even in the event that we have the tertiary treatment system, all of Indianapolis and Marion County is not sewered and there are many people who insist, I suspect for many years, that septic tank systems are perfectly adequate. But notwithstanding their objections we are determined to build sewers throughout our county. They will cost approximately $120,000,000 at present costs. Nor if we have the money are we necessarily going to have the opportunity to build. It has taken us one year fighting through the courts to manage to get a bond issue for 9 million dollars of sewers, not 120 million, and one of the reasons is that everyone in society is always eager to see sewers built, even if there is a demonstrable need from an environmental standpoint. This is simply to say that the politics of one city and one county bring a very expensive situation to bear and one which is fraught even with some dangers in terms of delivery once this occurs. Now, we're assuming all along that there are going to be the ways and means available, but these sorts of assumptions are at least precarious in our American Federal system. They are not insuperable and the course of these remarks this morning should not be construed to indicate that I am throwing up one strawman after another indicating why progress is unlikely. Quite to the contrary, I think that progress is only a matter of time, not only inevitable but desirable, but at the same time we do have a different system of government in the United States of America than, for instance, our British friends with whom I visited on much this same subject during May and during a conversation with Peter Gordon Walker about shopping centers, for instance, outside Sheffield, to take a hypothetical case. He pointed out that his office had an opportunity to okay each shopping center in England. I said, "each one?" He said, "Yes, each one. Every single one." Now, with that thought one can make certain that the transportation system brings people to the center of Sheffield where shopping may be provided for people. Likewise, if you want to turn off a number of private vehicles that enter the center city one can do that. One can force a number of choices in regard to transportation, location of many marketing situations, one can clear off large stretches of housing and build high-rise housing on the hillsides. One can do a number of things that effect the total environment and do so through the central office of the super ministry that Mr. Peter Gordon Walker heads in this situation. It is not necessarily a unitary system, but it is a comprehensive central system of government in which there is a dedication to a certain number of environmental objectives and given the authority of Parliament, the fact that one's government is in power one could proceed to get the job done. That is not the case in the United States of America. And I think that unless there is a degree of political sophistication with standards, with the degree of state cooperation or lack of it, the degree of local enthusiasm, but very importantly, both the expertise and the funds flowing through where they are required, unless this occurs an enormous credibility gap will happen at some stage not too far down the trail. And what I see at the local level is this sort of situation. At 1976 or 1977 approaches, and people dip into White River and pull out a specimen of what had occurred and find out that it is not clean, they're very likely to say to whoever the poor soul is who is serving as mayor at that time, or to anyone around the situation that you're either a fool or a dolt or you're incompetent or you're malevolent in regard to the environmental situation--totally unsympathetic. After all, at the Federal level people had the vision of what should have occurred in America. We wanted clean air and clean water, but at the local level those of incompetence and general ingratitude with regard to our heritage, have frustrated the whole business. Now, unhappily I suspect those persons caught in that situation will be swept from office and a whole new raft brought in, but they will be in no better condition. The credibility gap in regard to government all along the way will stay, remain. And so what I am suggesting very specifically, is, please, at the Federal level do not create standards which are demonstrably unachievable at the local level unless you are prepared to provide the expertise of how to do it and a good part of the funds to get it done. And the reasons for this are very simple: In Indianapolis, Indiana the means of local finance are property taxes, fines and fees. We are not the recipients of the progressive income tax nationally, all of the wealth that comes from our burgeoning economy is siphoned off essentially to the Federal government via a progressive income tax system. This is true of incomes of corporations and of individuals. As a city we are the recipient of almost none of this. Unless we can obtain a building boom, (this we have tried to induce,) promptly rush out, assess and tax buildings and improvements, (this we have done,) we have no funds whatever. And certainly no new funds for vast new standards and changes in our lifestyles. Yet at the same time there are revenues in our economy that are accruing and that must be applied in these ways. They are essentially Federal revenues, they are essentially ones that will need to be matched by sympathetic state legislatures, and where this does not occur the problems will occur in system. Once again not irresolvable but it is important to perceive at this point. Now secondly, let us take a look at a different type of dilemma that gets to the guts reactions of political issues. I cannot imagine at this point, although some of you can and are prepared to share this dilemma with me, precisely the sort of reaction we are going to have at that point in our history when we say to a citizen in a city, you cannot drive an automobile. Or, you cannot drive an automobile under these circumstances, with a growing list of circumstances. Or, you cannot use air conditioning, or some other convenience to which we have become accustomed. Now at this point, of course, as we discuss standards on the periphery of our consciousness our thoughts to some of these prohibitions might come into both, although we hope not for awhile. There are only so many battles that can be fought at one time. But it's already being suggested, I suspect, by some who are perceptive of the uses of power in this country, the castoffs in terms of pollution involved in this, but there are some very tough decisions ahead of us. Now my suggestion would be that these need to be perceived and need to be hit head-on rather soon if they are contemplated at all, because the backlash that will come at that point, that the specialist who now believes he sees something suddenly reveals to the ordinary citizen that he is going to be without the car, and without the air conditioner, that backlash will be very substantial. And my suspicion as a politician is that the backlash will be substantial enough to stop the environmental movement at that point very cold. Now, that is a chilling thought for everyone involved who is interested in environmental measures, but I believe it is a political reality. And in short as opposed to moving down the trail in exotic terms that ignore the general desires and wants and share thoughts of people in this country, I suspect that we are going to have to move in a way which takes into consideration the normal wants and desires of people. I think that there can be consistency here, but at this point I am not certain that there is. And once again looking at things from a practical political standpoint, in our city the thought really has not come into consciousness that in any way uses of power for heating or cooling might be curtailed, or uses of automobiles in any way might be curtailed. We have not attempted to face that dilemma and we're not going to attempt to face it unless we have to, simply because there are a number of other dilemmas that have very high priority in process, and we're not prepared to fight battles unnecessarily. If from the standpoint of your scientific expertise we are going to have to fight those dilemmas we need an early warning system because I have already suggested we are going to be fighting a very severe dilemma of finance, of sewering where people don't want sewers, of passing bond issues where they may not want bond issues, of attempting to do something that at this point people are not certain that they want. Let me make this third point -- that there has to be a shared sense of belonging to this system of the environmental quest.

Now by that I mean that very frequently people have been sold the thought that clean air and clean water, the protection of our birthright, the spaceship earth, the protection of all we have, etc. forces essential continuation of life, and in many cases the students are beginning to read books such as The Limits of Growth, or at least discussion of this variety in which the thoughts of population and pollution and energy resources, pollution, etc. moving concurrently toward a doomsday situation; this begins to take hold and have some meaning. But even then one of the questions raised by The Limits of Growth is an ethical and moral question which has not really been discussed, to say anything about being resolved, and that is that in most cases predictions or difficulty are at least a generation off, maybe two generations off. Now political dilemmas of that character in the past have usually not been solved. To take a very practical example, during the first times in which water taps did not emit water in New York City, the New York Times and the Wall Street Journal along with many citizens wondered, why? Why was there no vision in the political system and the economic system, etc. Well, one of the why's was quickly answered, I think by a sophisticated political pervert. Each of the mayors involved had a term of only four years. The fact is that the dilemma was twenty years away on occasion with regard to water planning. It is maybe that far away with regard to energy planning. It certainly is that far away with regard to some of the things we are talking about. The moral question is, given the fact that some curves may be heading into intersections, do we as individuals now have an obligation to provide at least the sustenance of life for those who are our children and our grandchildren, or three generations down the trail? What is the nature of our stewardship? That's a theological question in some ways; quite apart from being a practical political one, it's a very important one. The point that

I am making is that it is not a shared question very wisely right now, and it needs to be, because if the idealism of this is to be sustained, if genuine sacrifices are to be made, they will be made propably in terms of our children and our grandchildren as opposed to ourselves. And for many persons immediate consumption and immediate enjoyment has always been the hallmark of life, and certainly of political choice. Conceivably we can move into a new era of sophistication in this regard. I believe we will need to do so in order to be successful. If we do find some share existence when we have discussed some of the absolute complexities of the American Federal system, even if we have some consistency there of Federal, state and local situations, the fact is, and this is clear I am certain to all of you who toil in the vineyard, reform, that each change in the system brings about enormous ramifications with regard to each of the other aspects of the political system. For instance, in another field, the project Breakthrough -- that's what HUD attempted in eight of our cities -- one of the cities in which it was attempted was Indianapolis. And we found that in order to try to change perceptions of housing, the problems of zoning, problems of code enforcement or changes in use of materials, use of land, the whole political perception of anything that had HUD or government involved in housing to begin with, ... enormous changes.....

MRS. SHIRLEY TEMPLE BLACK
SPECIAL ASSISTANT TO THE CHAIRMAN
COUNCIL ON ENVIRONMENTAL QUALITY

I have just returned from Moscow and I bring you all greetings from my boss Russell Train. We had a most successful meeting with the Soviets, the first meeting of the U.S.-U.S.S.R. Joint Committee on Cooperation in Environmental Protection.

President Nixon and Soviet Chairman Podgorny last May 23 signed this historic agreement between our countries, and it was our job to implement the agreement.

We carried out our discussions in a friendly atmosphere of mutually beneficial cooperation.

We agreed to more than thirty specific areas of close cooperation between scientists and political leaders on both sides.

We have taken a firm step forward in attacking such mutual problems as air pollution, water pollution, protection and management of lakes and estuaries, pollution related to agricultural production, enhancement of urban environment, nature and preserves, marine pollution, biological and genetic consequences of pollution, influence of environmental changes on climate, earthquake prediction, Arctic and Subarctic ecological systems, legal and administrative measures for protecting environmental quality.

You will be hearing more about this historic agreement when the report is in general release.

Today, I wish to speak to you about some of the other major areas of environmental work and cooperation.

If the past teaches us anything, it is that every cause brings its effect, every action its consequence.

This crystal truth is the watchword of all of us who have worked for years under the U.N. banner, or elsewhere, in the cause of the human environment.

The very subject--environment--is a devil's playground.

The cry "foul air" or "poisoned water" evokes shouts of dismay and demands for action. Blood temperature rises, a calm stance becomes more difficult, logic more elusive.

From one side rise cries to correct environmental problems; from the other, rise words to caution: "Not enough knowledge; no basis for action; no money."

Our immediate temptation is to try to accommodate everyone. We think with our hearts, instead of our heads. The result? Pledges that are vague. Promises for programs that do not start. A quagmire of unfulfilled hopes and unsatisfactory compromises. Second-guessing a bit, we might have been further along if years ago we had backed off and taken a wider view of the problem.

Now we recognize that the quality of the human environment reflects our powers, and recently, it mirrors our conscience. It is intimately locked with the quality of our leisure; our adventure; our challenge; our inspiration; and the spiritual renewal we all need at some time.

For centuries we have sought to dominate nature. Even the Bible sounds a strange note: In Genesis, one-twenty eight, of all places, it says:

> "Be fruitful, and multiply, and replenish the Earth, and subdue it; and have dominion over the fish of the sea, and over the fowl of the air (no pun intended), and over every living thing that moveth on the Earth."

These aggressive and exploitive capacities have had their day. Now our sense of trusteeship has begun to re-awaken.

The international environment will change with us, or without us. It is changing at a pace and scale to create both great difficulties for individuals, business and government, and continued calls for more flexible and responsive social institutions.

If one agrees that the international environment is changing, should we not seek to guide that change in desired directions, and not rely solely on uncoordinated national restraints by 130-plus governments, industry, the market economy, and the individual? Of course.

Nationally we are well-embarked on a cohesive program. The President's Council on Environmental Quality, since 1970, has served as a compass in the bewildering complexities of this vast frontier. Recognizing that the scope of the Council's responsibilities range from the urban to the rural environment, from wildlife to human populations, from the terrestrial to the marine environment, from environmental law to the economics of environmental programs, from environmental monitoring to institutional and statutory changes, from reporting current environmental status to projecting future trends, and from the domestic environment to the full range of international environmental activities, it becomes clear that we can take great pride in the success of our efforts to date.

The EPA has been assembled at the same time to cope with the practical problems of the environment. Joining with an array of private and other public resources, we now are well on the way to define the problems accurately, devise the solutions, and to hold our own feet to the fire.

Cincinnati, with its durable history of work in sanitary engineering, is a logical cornerstone to further work in pollution control technology. With over 1,000 employees here, it is in the interest of efficiency and effectiveness that the new science complex should rise, and I am honored to be here to wish it completion on schedule, and a very productive life.

However, professionals more skilled than I are among you this week to speak on the scientific subtleties of national problems. I would like to direct your attention to the not-so-subtle problem that we live in a world of problems relating to the human environment.

The Monroe Doctrine is utterly passe when one considers international environmental problems.

Three years ago in plenary session of the United Nation's General Assembly I devised and delivered a speech about the need for mankind to adopt a new environmental ethic. As I recall my theme, it was all well and good to ring the fire bell, point the finger of guilt, and enact law and regulation, but treating symptoms of the problem was merely cosmetic doctoring of blemishes. It was not getting at the root cause of the problem. What was needed was a fundamental reappraisal of our values, rethinking the concepts of affluence, growth, and quality of existence. From this difficult review would gradually emerge a revised series of attitudes to guide our individual and collective actions, day by day. A new environmental ethic.

When we were in Stockholm, Margaret Meade, eminent anthropologist, referred to this same aroused perception as:

> "A revolution in thought comparable to the Copernican Revolution, by which, four centuries ago, men were compelled to revise their whole sense of the earth's place in the cosmos."

Bold words from a first-rate scholar. Yet we all know there are many steps to be taken between here, and there.

Those fourteen days of Stockholm were, in my appraisal, a remarkable beginning. Imagine the problems of 114 delegations with divergent national views, regrettable holdouts by the U.S.S.R. and several other East European nations, a string of firecrackers from the People's Republic of China, and 10,000 concerned vocal, but unofficial, attendees.

During those fourteen days, however, we rallied all the participating nations in support of a charter of principles, plus an action plan containing some 200 recommendations covering pollution, preservation of wildlife and plants, population control, establishment of a new U.N. Environmental Organization and funding its effort to the tune of almost $60 million.

As a measure of the universality of man's new concern for earth achieved at Stockholm, listen to the opening words of the Declaration of Principles on the Human Environment:

> "Man has a fundamental right to freedom, equality, and adequate conditions of life, in an environment of quality, which permits a life of dignity and well-being."

This most remarkable document then stresses that "man bears a solemn responsibility to improve the environment for present and future generations . . . ."

Many of you know it was not all hearts-and-flowers at Stockholm. Our disagreements were often quite sharp. The Chinese rose several times to harpoon the U.S.A. with bitter denunciations of ecocide, herbicide, and general unworthiness. Coincidentally I was manning the chair in plenary each time, and received the flow full in the face, as I tried to maintain composure and take running notes for our rebuttal statements.

On the opening day of the Conference, the Chinese surprised us all with a demand that a new working group be formed to draft a new Declaration on the Human Environment rather than the one submitted as a result of our 27-nation working group which began work in 1971. In fairness to the Chinese, and others, it is understandable that in the final stages of consideration many members would wish to press for inclusion of material expressing their main concerns.

The U.S. had initial doubts about the wisdom of creating a new working group starting from scratch again. New conflicting views might well create an insuperable deadlock, and make a generally acceptable declaration impossible.

However, on June 8, we did create a new working group, including China. This group met literally night and day until the final moment of approval by the Conference. The final text preserves a number of extremely important principles of conduct for states in dealing with environmental problems of international significance. Chief among these is Principle 21, which declares that states have "the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction." Also of notable importance are such provisions as Principle 2, declaring that the earth's living and non-living resources, and representative samples of natural ecosystems, must be safeguarded for present and future generations; Principle 6 stating that excessive discharge of toxic substances and heat into the environment must be halted to prevent "serious or irreversible damage" to ecosystems; Principle 16 calling for application of appropriate demographic policies where growth rates or concentration of population are likely to have adverse effects on the environment or on development; and Principle 25, declaring the obligation of states to "ensure that international organizations play a coordinated, efficient and dynamic role for the protection and improvement of the environment."

Disagreements, viewed in the light of our accomplishments, only serve to illuminate the common problems which gave birth to the Stockholm Conference, and our common resolution to solve them. Having been out of the country in Moscow until yesterday, and removed from the latest political reports, some of what I read today rings ominously of "isolationism."

We cannot have a misty utopia which begins and ends at our national borders. This would have serious overtones for the type of international cooperation that so many of us have worked so hard for.

Three decades of icy, irrevocable history has locked mankind in a large, mutual embrace and seldom a tender embrace. Be there a public figure so naive as to reject the notion that air and water encircle the globe without benefit of passport, bearing with them all they collect from every spot on earth, and leaving behind on every land and shore the residue?

An example of a different sort of political action, a little more inspired, occurred in Stockholm as we, among others, were attempting to rally support for an international agreement for a 10-year moratorium on commercial whaling.

Despite regulation by the International Whaling Commission, world whale populations have drastically dropped, to where all exploited whale species are immediately or potentially endangered or greatly depleted. This recommendation reflects worldwide recognition that whales, inhabiting the international seas, are the concern of mankind as a whole--not solely for economic reasons but also for their role in marine ecosystems and for their distinction as the largest and possibly the most awe-inspiring members of the animal kingdom.

Despite their size, the whale problem at Stockholm was submerged by issues of more pressing importance, and on a vote we feared that the whales would sink for lack of attention, until several hundred young men and women appeared, and reinforced our delegation effort.

They formed a processional, created a float draped in black, and marched around Stockholm demanding that the whales be saved. Russell Train, Chairman of the U.S. Delegation, with his wife, joined the march. They paraded to my hotel, chanted for me to join, which I would have except that at that moment I was working inside the Conference Hall on the same issue. The net result: The whale issue surfaced for proper consideration; the resolution passed thumpingly, with only 3 nay votes.

In these few remaining moments may I touch on several other key accomplishments from the Conference. All are in the form of resolutions. All are to be presented to the current 27th General Assembly of the U.N.

First, organizational:

An Environment Secretariat, headed by an Executive Director, to be established as the focal point for cooperation, coordination, and effective management of environmental activities in the U.N. system.

Guiding the Secretariat from a policy and review standpoint will be a Governing Council for Environmental Programs, to consist of 54 member states elected for three-year terms on the basis of equitable geographic distribution.

The Council is to report to the General Assembly through the Economic and Social Council, not as erroneously reported, through UNESCO.

To ensure cooperation and coordination among all U.N. agencies, there will be an Environmental Coordinating Board, chaired by the Executive Director, and to ensure efficient international exchange of environmental problems and solutions, a referral service is to be formed.

Hundreds of environmental information services and data are in operation but except to relatively small user constitutencies, are relatively unknown and unused. The referral service would be a modest and practical tool to tell what information services exist, where they are, and how to gain access to them. It would, in effect, place countries requesting information of all types in contact with appropriate information resources in support of local, national, or international environmental programs.

Having thus established an organization, we breathed life into it with creation of a $100 million voluntary environment fund, to be administered by the Executive Director and used to finance programs coming out of the Stockholm Conference. Over 100 nations agreed to participate, the U.S. has pledged $40 million, and when I was working with U.N. problems in Geneva in mid-August, we had gone over the 75% mark.

To pick out six specific program highlights:

1. We recommended steps to minimize release of such dangerous pollutants as heavy metals and organo-chlorines into the environment.

2. We recommended a global "Earthwatch" program to be coordinated by the U.N., to monitor and assess environmental trends in atmosphere, oceans, land and human health.

3. We called for early completion of conservation conventions, including the World Heritage Trust for natural and cultural treasures and a convention restricting international trade in endangered species.

The significance of this trade-restriction approach lies in removing the incentives for killing wild animals for sport or pleasure, morbid pastimes usually conducted by affluent alien hunters who safari in primitive lands; and in removing commercial incentives for pelts, horns, tusks, and feathers, again usually consumed in a different land than they occur.

Other highlights:

4. We called for world programs to collect and safeguard the world's immense variety of plant and animal genetic resources on which stability of ecosystems and future breeding stocks depend.

5. We urged greater emphasis on population policy and accelerated aid to family planning in countries where population growth threatens environment and development goals.

This action stemmed from a very difficult decision to defer our population concerns bearing on the environment of human settlements--which includes cities as we know them--to the special World Population Conference scheduled in 1974. Although we supported this recommendation, we also joined to support a new recommendation submitted by Norway, bearing on family planning.

This called for the World Health Organization and other U.N. agencies to increase family planning assistance without delay, and intensify research in this area.

The recommendation was upheld in plenary vote, 55-18 with 4 abstentions after long debate. We welcomed this amendment based on our conviction that the world population problem, with its great environmental implications, should be faced in this Conference, even though a World Population Conference is to be held two years hence.

And finally:

6. The Conference urged completion in 1972 of a global convention to restrict ocean dumping.

Having first proposed an ocean-dumping convention in June 1971, the U.S. strongly supported the proposal to refer our draft convention to the U.S. Seabed Committee for comment, and thence via a special meeting in London for final action before presentation to the General Assembly this fall.

The draft convention itself is quite detailed and technical, but in essence the U.S. supported the entire recommendation as it urges states to take legal measures, nationally, regionally, and internationally to bring major sources of marine pollution under control.

The United States, however, was explicit in rejecting any inference that international law be abused in the process. Particularly the U.S. felt that appropriate controls on nuclear defense vessels should be national controls, taking into account recommendations of the IAEA and other competent agencies, which we pledged to follow as closely as possible.

In conclusion, may I leave this thought with you.

No doubt, countless concerned people must see us, representatives of international governments, moving at an agonizing, almost dreamlike pace. But move we have--and that is news. The official attention of governments is at last swinging around to confront questions that have been waiting for years to claim our attention--questions deeper than the quantity of goods, questions focused on the quality of life. Life not only for the few who are blessed with affluence but for the billions who are not.

What, then, is to be our Stockholm Conference message to the world?

Our report goes to many official addressees: To the United Nations General Assembly, U.N. agencies, governments, scientific organizations, universities, specialized groups of many kinds, all of them involved in essential aspects of this most comprehensive of human concerns, the environment of man.

But what of that other addressee, the most important of all--the people of the world? What is there to say to those who lived at the Hog Farm in Stockholm, those unofficial faces in the galleries, those millions who listen from their vantage points in cities and villages throughout the world?

No doubt each delegate would write a different message. As an American who believes that evils can be cured and wrongs can be righted, may I bring you, my friends, this message:

Man, with wonderful and terrible powers placed in his hands by science, stands in greater need than ever before of a new ethic to guide his actions. Environmental warnings around us are challenges not only to our technical skill, but to our spirits. They warn that we have been wounding earth. Earth, our home, the home of all the billions of our children, and of their children. We aspire to live well in this earthly environment--but to do so we must acknowledge our kinship as human beings, and the obligations of that kinship, as the great law transcending nation, and ideology, and every other interest.

It does little good to say that governments must not attempt too much, or that man is not virtuous enough to rise to the occasion of this age.

My friends, he had better be virtuous enough. He had better rise to the occasion. The virtues of foresight and responsibility and compassion which he is now called upon to show as never before are the only practical guide to a decent life in this crowded world.

That, my own friends at home, is one delegate's brief message from a brief moment of history in Stockholm. I do not expect that a sudden revolution of the spirit will pervade mankind just because we worked intensively for 2 1/2 years, met for two weeks in Stockholm, and approved an action plan with 200 recommendations. But a turning of the spirit there surely must, and can be. It can be brought about, not by us alone, but by the dawning on our spirits of new facts and new truths--that man and woman, in all their glory and frailty, have acquired the Promethean power to shape the future for good or evil, and for all time. And that this incredible power must be used with more wisdom, compassion, and humility.

Thank you.

Andrew A. Aines
National Science Foundation

I am thankful to my colleagues in the Environmental Protection Agency for the invitation to address this distinguished gathering of scientists, engineers, information scientists, librarians, industrialists, administrators, and others. It is my regret, however, that an uncooperative calendar has made it impossible for me to be present to hear the previous speakers and to participate in the important business of the Seminar.

I am also thankful for the opportunity that standing before you gives me to congratulate the sponsors of the Seminar and more particularly the people who have worked so hard to make the Seminar a reality, people like Woody Horton and Sarah Thomas and so many others.

In the brief time I have available this afternoon, it is my intention to provide you with information pertaining to environmental quality information and data activities going on in the National Science Foundation and elsewhere, and to make several observations, more general in nature, concerning the climate needed for attaining progress in the development of a national EQ information program. I shall start with the work of the National Science Foundation.

The concern for the health of the environment is strong in the Foundation, a concern which is considerably more than vocal.

Early last year, the National Science Board forwarded to President Nixon a report entitled "Environmental Science - Challenge for the Seventies". In its foreword, the Board paid its respects to a number of organizations in and out of the government and approximately 150 scientists, who made important contributions to the report. It is not my intention to discuss this report in detail; it is available through the Superintendent of Documents for 40 cents. There are five parts to the report. After an introduction, it discusses the past decade and expanding horizons; the present day and the problem of timing; the future and levels for action in disciplinary science, intermediate scale systems, and global systems; its last part deals with resources for environmental science, broken down into sections on manpower, funding and organization.

Of direct importance to us is the recognition given to the information process. Hardly a page of the report fails to discuss the need for information and data for researchers, for managers, for administrators, for government officials. The requirement for an apparatus that will link workers in the environmental field together in an information and communications network more effectively than anything we have today is repeated and repeated. Here are a few quotes selected at random that underscore what I have just said:

"Problems (involving pollution) can be mitigated, but absolute solutions are probably unattainable. The best that can be sought, therefore, is to optimize, to try to achieve the wisest cost-benefit decision for society for each action contemplated. Such a strategy requires a strong base of scientific knowledge and understanding of the environment, ability to predict its future course, and especially the ability to construct models through systems analysis of the environment..."

"Environmental science, today, is unable to match the needs of society for definitive information, predictive capability, and the analysis of environmental systems as systems. Because existing data and current theoretical models are inadequate, environmental science remains unable in virtually all areas of application to offer more than qualitative interpretations or suggestions of environmental change that may occur in response to specific actions."

"The natural environment is not a collection of isolated events and phenomena, but rather a vast, integral, mutually interacting system. The recent advent of new technology and technique (satellites, advanced computers, instrumentation of many types, and the methods of systems analysis) for the use of environmental science has, indeed for the first time, provided feasibility for attacking the scientific problems that this environmental system presents. The tasks ahead, however, are of unprecedented magnitude and difficulty." (End of quotations)

The purpose of the report was to reflect on the challenge of the seventies, but it did not describe what is going on in the Foundation, which is the next order of business.

The first recommendation called for the planning and management of human settlements for environmental quality. A check of the various NSF Directorates' programs reveals that there are a number of projects in this area, amounting to about $15 million a year. Some of the topics include work on water supply, sewerage, noise, family planning, population and natural disasters.

The second recommendation deals with environmental aspects of natural resources management to the tune of more than $40 million a year. Here again a number of NSF bodies are involved in work dealing with pest and agrochemical controls, waste recycling, forests, wildlife, protective conventions, international protection for ecosystems, genetic resources, fisheries, water resources, minerals, energy, resource development, biosphere research, development and climate, remote sensing, and my favorite, whales.

The third recommendation involves identification and control of pollutants of broad international significance. About $13 million a year are being spent on research on dangerous substances, knowledge of pollutants, pollutant warnings, national air and fresh water monitoring, atmospheric monitoring, marine pollution, terrestrial ecology and information exchange.

The fourth recommendation includes research on education, information, social and cultural aspects, which tallies up to about $17 million a year. Research is going on in continuous social diagnosis, education, training, public information, wetlands, islands for science, endangered species, exchange of information and referral service.

A check of our recent grants and contracts awarded reveals such titles as: "Research Needs Concerning the Incorporation of Human Values into Environmental Decision-making", "Survey and Analysis of Federal Environmental Law", "Interdisciplinary Investigation of Environmental Pollution by Lead and Other Heavy Metals from Industrial Development in the New Lead Belt in SE Missouri", "Predimability of the State of the Atmosphere", and others.

In July 1972, NSF sponsored an environmental conference on land use bringing together ecologists, biologists, geographers, atmospheric scientists, psychologists, economists and many others. About the same time, the Foundation made a grant for a statewide impact of nitrogen fertilizers used in irrigated agriculture on surface and groundwaters to be undertaken in California. Another grant was provided Montana State University to study the effects the $20 million Big Sky of Montana recreational complex will have on the environment. As many of you are aware, the National Science Foundation is providing funds to the Oak Ridge National Laboratory which is working on elements of an environmental information network, which may make a significant contribution to a U. S. system for data on ecological and anti-pollution activities. Several information analysis programs, as well as several data bases, are being developed; a number of these are already in operation, I believe.

The Foundation has in its Research Applied to National Needs Program, a division of Environmental Systems and Resources, under Dr. Phillip Johnson. There is also a Division of Environmental Sciences in the Foundation Research Directorate, under Dr. Crary. The Office of Science Information Service is involved with EQ information in a variety of ways. Melvin Day provided the U. S. Delegation at the Stockholm Conference with his expertise. The recommendation to establish a Referral Center internationally was generated and developed in this office. Mr. Day heads an environmental information panel in the Organization for Economic Cooperation and Development (OECD), one of the most important international organizations in the world. If all goes according to script, the Committee on Science and Technology will establish, with the approval of CEQ, a task group on environmental information, whose task it will be to help CEQ and EPA and other Federal agencies involved with EQ information in the development of information and data programs. COSATI, as you are aware, is chaired by Mel Day, Head, of the NSF Office of Science Information Service.

As you have heard, the National Science Foundation has many projects on the books that are directly involved with information programs and others that in one way or another have an indirect, but traceable, relationship. There are a number of people, including the National Science Board, which governs NSF, deeply interested in contributing to progress in this field. The Foundation fully recognizes the lead roles of CEQ and EPA and considerable coordination takes place with these organizations to insure that the funds provided for research are placed to obtain maximum return. In short, NSF should be considered not competitive, but supportive. We are an ally in the crusade to improve the physical environment that surrounds us. So much for NSF.

Earlier, I discussed the National Science Board Report, "Environmental Science-Challenge for the Seventies" and the concern expressed for improvement of the information process. I think it is fair to describe the report as one prepared by concerned men and women outside the government. Now I would like to refer to a second report, "Environmental Quality Research and Development", which was prepared by the Ad Hoc Committee on Environmental Quality Research and Development of the Federal Council for Science and Technology. You can buy this report from the Superintendent of Documents for the bargain price of $1.25. This report is a review and analysis of Federal programs undertaken by a fairly large group of government people from many Federal agencies. All of the major sources of pollution were studied. I will not go into detail; the report has 137 pages crammed with information and data, but I would like to mention a few recommendations pertinent to our concerns. One recommendation calls for the acceleration of application of research results. Existing knowledge must be more promptly and effectively disseminated, organized, tested, and put to use to solve important problems. Mechanisms for program coordination must be strengthened. This includes better mechanisms for intraagency and interagency collaboration and joint planning, closer cooperation at the project level, and other requirements that call for information and data interchange. More extensive use of modelling was urged, a program that depends heavily on good information and data. The need for more sensitive, reliable measuring and monitoring was recognized. Both instrumentation and techniques are involved. Greater awareness of knowledge already available and not being used and a more systematic and determined effort to organize and apply such knowledge to the solution of important problems were recommended.

Reading the two reports I have summarized side by side reveals the similarity of findings and conclusions; recommendations also turn out to be uniformly standard. The need for better information and data and for the apparatus that is employed to store and retrieve them is cited over and over again. Both reports urge that known knowledge be better applied, although there is little said about the obstacles that stand in the way of such desired treatment. Perhaps at this point it would be worthwhile to discuss the present climate and what is needed to establish a better national EQ information and data system.

In the last decade, a considerable number of reports and studies have been prepared dealing specifically with the problems of scientific and technical information and communications. Many of these involve the general subject, but others, like the two mentioned earlier, are concerned with the information problems in specific fields. I wish I could tell you that these reports have a powerful and immediate impact on programs. Literally, hundreds of useful recommendations have been made in recent years to improve the information process, recommendations made by substantial members of the science community. The response has been unenthusiastic. Hardly any of the recommendations are implemented.

The reasons that seem to be given for the inattention are many. User clamor for new systems is absent. Users are not involved in the development of proposals, nor are they brought into the planning of systems. New systems are expensive to establish and the users are not economically prepared to support them. Top management and policy-makers have higher priority problems to worry about. They are not convinced that support of new investments in information systems are warranted. Information people have not been very effective in articulating their cause. Little attention has been given to the development of cost-benefit desiderata. The assessment of performance in the world of information systems is done more on a personal basis than on an institutional or activity basis. The condition of flux in this field, the rapidity of the proliferation of data and information, and the insurge of new information technology make planning and orderly growth difficult. The country has had little or no experience in establishing sensitive and effective scientific and technical information systems for socioeconomic problem solution, systems that would make it considerably easier to cope with the complex problems that our country and other countries face. There is much work to be done in the development of policies needed to obtain action. Without policies and guidelines that have been carefully prepared with the participation of the information-generating, information-handling, and information-disseminating communities, concerted action will be harder to achieve. New mechanisms are needed to attain the interaction of the public and private sectors. In a world that is shrinking with the growth of communications, as more countries become industrialized or enter the post-industrial phase, the development of Federal, national and international systems for science and technology - networks of knowledge - requires close interaction on an international basis. To harness the new technologies to our needs effectively and efficiently, it will take a considerable amount of engineering - social, economic, and physical.

The requirement for the kind of actions I have just mentioned has been recognized in only a few countries. The governments of Japan, Canada, West Germany and the Soviet Union - and there may be more that I am not aware of - have done some of the hard thinking needed to establish modern scientific and technical information systems. They are a long way from achieving their objectives, but at least they have broken the ice.

Let us take stock at this point.

Environmentalists, scientists, engineers, administrators, and Congressmen, to name a few critics, have made strong recommendations for improved information systems. They rest their case largely on the lack of information and data needed to make decisions, need to obtain requisite knowledge wherever the lack of such knowledge hampers reform, establish mechanisms wherever needed for better sharing of information, and the like. They distust a system that does not optimize freedom of information and the establishment of highly organized series of data banks that provide for free flow of information. There is a lack of concern for planning and organizing the information process at high levels or if not concern, certainly a measure of inaction. Policies and priorities are still to be formulated in my judgement. The "bits and pieces" approach is not worthy of a great country like ours, but this is a personal assessment. We lack a council to bring the many governments groups (Federal, state and city) together with the private sector EQ community concerned with the communication process. I do not consider the SEQUIP workship nor this very important symposium adequate substitutes for this requirement.

The third annual report of CEQ estimates that the U.S. will spend $287 billion on pollution control through 1980, nearly triple the amount it had forecast for the first six years of this decade. In reading this statistic, I could not help but wonder how much of this sizable investment will go to improve the basic, necessary information processes involved; I wondered if such an appraisal had been made; and I wondered what additional costs to the taxpayers of our country would be the consequence if we did not engineer a more efficient and effective information system.

I believe that these questions need to be discussed at this symposium, if you have not already done so. If this community is unwilling to apply its intelligence to these "gut" problems and others in the same ballpark, it misses an opportunity and shirks responsibility at the same time, or so it seems to me.

Another point or two and I am through. About two years ago, minus a few months, a report was prepared for the President under the auspices of the Office of Science and Technology, entitled, "Protecting the World Environment in the Light of Population Increases." The authors were representatives of nine Federal agencies. The report made a case for stabilized populations, economic viability, resource management, and environmental enhancement as very necessary objectives for all mankind. It abounds with facts and figures to buttress its findings.

I mention this report because it brings into focus the grim reality that a whole new family of information and data systems are mandated when we address our energies to the task of solving multiple social, political and economic problems in an era of crises.

This makes the task of blueprinting our knowledge-handling systems even more complex and difficult in the future. I am confident that the scientists, engineers, information specialists and others that make up this audience will become increasingly sensitive to the role of information and data in the crusade to solve the problems facing the United States and all countries.

Moreover, I am confident that we will depart from our role of somewhat passive spectators to active participants on the multidisciplinary teams in the public and private sector devoted to keeping society and its institutions viable and healthy. The stakes are too high for us to sit on the sidelines to watch the action; there are no longer any comfortable sidelines on this troubled planet.

In conclusion, let me point out that the challenge facing the information specialist is great in the period ahead. Science and technology can only flourish if they are free and untrammeled. Information systems, if not designed to help keep them open-ended and viable, can be counterproductive. This makes the task harder, but even more necessary. We will respond to the challenge.

W. A. Radlinski
Associate Director
U.S. Geological Survey

The Department of the Interior is by far the largest single source of multi-purpose data and information about this Nation's land, water, and mineral resources. It is the principal Federal agency for management of our public lands; administering the National Parks System; protecting our sports fish and wildlife; promoting outdoor recreation activities; developing our water and power resources; and providing the answers to basic questions about our land, water, and minerals.

Examples of Available Data and Information

From our libraries, distribution centers, sales outlets, information offices, and from our operational units, you can get a plethora of reports, maps, photographs, and statistical data which you could not begin to digest in a lifetime. Let me cite some specific examples.

- If you telephone (605) 339-2270, a pleasant female voice will answer in Sioux Falls, South Dakota, and within minutes she can tell you whether at our EROS Data Center we have a picture of your area of concern taken from the ERTS-1 satellite that is now circling the earth. All you have to give her are the geographic coordinates. She will also tell you when the picture was taken, how much cloud cover it may contain, and how to order it. Of course if you do not wish to telephone, you can write for the same information.

- Maybe instead of a picture, you would like one of those nice topographic maps we produce. In that case, write or call the Geological Survey, Arlington, Virginia, (if you're east of the Mississippi) or Denver, Colorado, (if you're west) and we will send you the latest multi-colored edition for just 75 cents. We distribute over nine million such maps every year. We can also provide you with the National Atlas of the United States. This 400-page hard-bound volume sells for $100 a copy.

- Do you need some information about perlite, or aluminum, or zirconium? You can learn all about them from a 1300-page comprehensive document entitled Mineral Facts and Problems issued by the Bureau of Mines which includes 88 mineral commodities. This encyclopedia on our mineral resources is updated every five years and costs $10.75 in the cloth-bound edition.

- Would you like to have the latest information on the status of the trans-Alaska pipeline, or our geothermal program, or the Southwest Energy Study? Write to FACT, Department of the Interior, Washington, D.C. 20240, and you will receive a single-page update on the current status of each. This type of service is provided on most of the current issues of Departmental concern.

- Let's say you're doing some research on the geology of the West, or the East, or wherever. What better place to get your background than from the Geological Survey library in the GSA Building in Washington. It contains over $500,000 volumes, 325,000 maps, 360,000 pamphlets and 8,000 periodicals--the largest earth-science library in the world. We also have smaller, but substantial, libraries in Menlo Park and Denver.

- Do you have a need to know about the toxicity of DDT on condors, or geese, or salmon? The Bureau of Sports Fisheries and Wildlife can tell you. Its data system includes information on the effects of toxic chemical substances on a vast array of living organisms determined under an extensive variety of laboratory and natural conditions.

Data Vs. Information

I could go on indefinitely with such examples, but let's pause for a moment and consider what I have given you. As a sophisticated group of information specialists--generators and users--you recognize that I have cited a mixture of examples of data and information. What is the difference?

Data, in a pure sense, are principally quantifications of field or laboratory observations. The user must make his own interpretation of their meaning with respect to his area of concern. Most data systems are storage and retrieval mechanisms, providing the user with a do-it-yourself kit for further analysis. An example would be the measurement of streamflow such as we record at 18,000 gaging stations in the United States. These and other related data are available as statistical summaries in Water Supply Papers of the Geological Survey.

Information, on the other hand, is knowledge derived from interpretating data, such as digital models of stream systems that are prepared from the streamflow data. These are presented in reports useful for making water supply and water management decisions. Another example is a geologic map. The geologist makes numerous observations of the distribution, nature, and attitude of rocks; interprets them in four dimensions, including time, and expresses the results on a geologic map.

Information Systems

The collection of data and presentation of information are both quite necessary and important. But to be more responsive to the complex resource and environmental problems of today--and tomorrow--we must take further steps to help facilitate their use. Thanks to computer technology, we have information systems designed to do just that. If you will accept my definition, an information system is an established way of combining, analyzing, and translating data in a manner that conveys not only knowledge but also understanding. One could also define it simply as any systematic process for receiving and transmitting knowledge, or in a broader sense, as a functioning organization for systematically collecting data, converting it to information, and disseminating it. A well-designed information system includes a reference system as well as a ready means of storage and retrieval.

Information System Example--Water Resources

An example of one of Interior's many information systems (we have 119 by a recent count) is the Water Resources Scientific Information Center of the Office of Water Resources Research (OWRR). The Center's information base includes: (1) citations with summary abstracts of the literature on results of research and engineering investigations, as well as selected legal and administrative documents and (2) summary descriptions of research projects in progress. Both types are computer stored and made available in published form in the twice monthly Selected Water Resources Abstracts and the annual Water Resources Research Catalog. The information is also used to prepare topical bibliographies and other literature-search products. It currently includes over 50,000 items and is being expanded at a rate of approximately 16,000 items per year.

The summary descriptions of water research in progress is an annual catalog prepared by the Smithsonian Science Information Exchange. The latest edition of the catalog contains summary descriptions of more than 6,300 research projects, including input from 80 foreign countries. The Center also supports an experimental four-terminal national communication network, three at universities, and one in Washington. Each of the terminals provides direct on-line access to the Center's computer stored information base.

Information System Example--Public Land Use

Still another example of an Interior information system is one in use by the Bureau of Land Management for the management of the 453 million acres of public lands under its jurisdiction. These vast and widespread acreages are sources of recreation, forage, timber, water minerals and energy fuels, wildlife, open space, and lands to build upon. As such, they are also the source of many environmental problems.

The system designed to cope with these problems involves the collection of information about resource values, problems, potentials, and public needs; an inventory of existing resources; and an identification of the various alternatives for development. An economic profile is also prepared to analyze population, income, industry requirements, and other related economic factors. In addition, a profile is developed which identifies the social and organizational factors, the planning area, local planning and land use controls, commitments, constraints, and similar information. These information frameworks are then used to prepare more detailed action and development plans for the public lands.

Resource and Land Information Program

Other examples of data, information, and information systems of the Department of the Interior are on display in our exhibit here at the Symposium. There are of course many, many more and as you ladies and gentlemen know from the discussions of the past two days, there are also a lot of information sources elsewhere. Even so, the resolution of complex problems stemming from the interaction of population and economic growth, resource depletion, and environmental conservation is often rendered more difficult because the data and information required are not readily available to decision-makers. In some cases the information needed simply doesn't exist. Too often it exists but is in repositories unknown to the user. Even when located, much of the time the information is presented in technical jargon that is almost useless to the non-technical user.

Considerations of time and economy, and pressing environmental issues, make it imperative that the work of the many existing organizations that collect, process and interpret data for their own purposes, but whose information can contribute to broad problem-solving endeavors, be brought together under a cooperative, integrated program--a program to analyze objectively the alternatives in land use, and to evaluate the tradeoffs between resource development and environmental conservation.

Such a program was established in the Department of the Interior by order of Secretary Morton on September 1, 1972. It is called the Resource and Land Information Program, or, if you prefer acronyms, the RALI Program.

The RALI Program is being designed to provide a national information system network utilizing existing data acquisition capability, encompassing conventional techniques, and sophisticated remote-sensing from satellites and aircraft, coupled with an interpretation, analysis, and translation program to produce products that are directly applicable by the user to his problem.

It will operate within a functional framework of a National center, several regional centers, and a multitude of local centers. This framework will permit a high degree of interaction with users at the State and local level, as well as with the Federal agencies. It will also facilitate the collection and dissemination of data and related analytic services, and provide for the monitoring of data uses required for efficient systems management. The centers at all levels will provide a reference service, via a catalog system of available data, to other resource and environmental data held by Federal and State agencies, universities, and private companies (for example, utilities).

A large area of immediate application will be in the preparation of environmental impact statements. At State and local levels, where many non-Federally operated centers will be established, data and analytical services will be provided in support of the proposed Land Use Policy and Planning Assistance Act.

Information under the RALI Program will be provided in two broad categories:

1. Comprehensive National and multi-State coverage for a limited number of data attributes within the 1:100,000-1:250,000 map scale range. Much of this map data will be digitized with a density comparable to a grid format of from 40 acres to 1 km^2 for compilation, interpretation, analysis, and display via computer.

2. We will also provide detailed coverage of State or local high priority areas with the scale or density and data attributes (perhaps several hundred) appropriate to the area or problem. These high priority areas, totaling perhaps 20-30 percent of the country, would include national growth areas, economic development areas (e.g., oil shale or coal strip mine areas and transportation system nodes), and intensely managed public lands.

Within these data categories the user's data requirements can be met in a number of ways, depending on his needs and his ability to interpret and use scientific data. For example, the user could obtain:

Raw data (e.g., geologic field data or fish counts). Some users will prefer to apply their own interpretation to the data while others may require the technical assistance of the RALI analytic staff.

He can also get interpreted data (e.g., landslide potential and building suitability maps, both of which are successive derivatives of geologic data). The extent to which the data are translated from their basic forms to a derived form which includes engineering, economic, and socio-political considerations, the more valuable they become to decision-makers.

The system will also make available certain kinds of analytic predictions (e.g., flood potential resulting from various patterns of land use).

Finally, the program will provide analyses of alternative policies (e.g., the use of models and simulations to predict outcomes in advance of decisions).

The RALI Program will be designed to be flexible to cover or include new topics, areas, or attributes as technology changes and new problems arise or new solutions are found. Its essence is quick response to user needs. As needs change, so will the program. Implementation will involve working closely with a number of organizations to insure that the program adequately meets the needs of the users it is intended to serve. Several visits have already been made to State organizations and others are planned.

Department of Natural Resources

The Resource and Land Information Program will be greatly facilitated under a Department of Natural Resources which as you all know is one of the new departments proposed in President Nixon's plan to reorganize the Federal Government. With the Department of the Interior as the nucleus, the new Department would bring together under a single wing most of the agencies that now deal with the multiplicity of earth resources, land use, and environmental problems, functions, and responsibilities. Under the five principal Administrations--Land and Recreation; Water Resources; Energy and Mineral Resources; Oceanic, Atmospheric and Earth Sciences; and Indian and Territorial Affairs--the ability to collect and disseminate resource and land information under an integrated program will be greatly enhanced.

In one of the proposed DNR Administrations alone, the Oceanic, Atmospheric and Earth Sciences Administration (OAESA), the combination of the Geological Survey's scientific and technical capabilities in geoscience, hydrology, topography, geography and earth resources remote sensing, with those of the National Oceanic and Atmospheric Administration (NOAA) in atmospheric science, oceanography, geodesy, geophysics, marine biology and meterological satellite technology will provide OAESA with the broadest spectrum of resource and environmental scientific information in the United States and probably in the world. Already we have begun to look jointly into the interface between the Environmental Data Services of NOAA, including the National Climatic Center, the Environmental Science Information Center, and the National Geophysical and Solar-Terrestrial Data Center, and the RALI Program.

Conclusions

There is no way that I can cover all of the information services of the Department of the Interior in the short time available for this talk. In fact, I couldn't do it if I had all day. And yet, in spite of these vast amounts of data and information, available from Interior and elsewhere, they are not enough--nor are they always available in a form that is useful--nor are they integrated--or translated--or interpreted--or standardized--or easily accessible. Isn't this then a clear case for a RALI type program?

I recognize that this is a Symposium on environmental information and I have been talking about resource and land information--but, to make meaningful judgments about the environment, the effects of the availability and uses of our resources and our land should be taken into account--and vice versa. And we will probably have to look toward at least a linkage with demographic, economic, and social information systems, even though we do not incorporate such data into our own systems. It is on this point that I will end my talk with a quotation from the Third Annual Report of the Council on Environmental Quality, under a section entitled "Interrelationship of Factors Determining the Future", which reads as follows:

> "All of the factors discussed above--pollution, food supply, resource availability, industrial growth, pollution technology, economic, government policy, and other social factors--are closely interrelated, and they directly help shape our future environment. They may be separated for some analytical purposes, but in fact they are part of a single, constantly changing world, and if we are to look into the future, they must be understoood and treated as part of one dynamic system."

Honorable Peter G. Peterson
United States Secretary of Commerce

All of us, I suppose, have at one time or another harbored the wish that we lived in simpler times than these, or that we could trade 20th Century conveniences for 18th Century serenity.

Our private lives are filled with complexity. The generation gap, the sexual revolution, the atomization of family life and the deadly lure of narcotics, for example, have made the job of raising our children a nightmare of hellish dilemmas. The dominant public issues of the day are of such surpassing complexity that even the wisest men see only dimly how we can successfully negotiate our way through the rocks and shoals that loom in the fog ahead.

All of you are here today, of course, because of your deep concern about one such issue: how we go about halting our mindless plundering of the environment so that we can ensure that our children's heritage will not be a dangerously impoverished one -- indeed, so that we can ensure that they will have one at all.

Finding a way to reverse the drift toward ecological disaster clearly is the most urgent among many urgent tasks on the national agenda. And no Administration, I would add, has devoted more energy and resources to that task than the present one.

We cannot afford to temporize. And I do not defend those businessmen who want to put off the day of reckoning. The business community as well as the public must face the problem head on and now. The price of delay is exacted in unhealthful water, contaminated food supplies, diseased lungs and a pillaged landscape. Delay could make America the Beautiful into America the Wasteland.

The price of delay is simply too high.

For too long our business economy has assumed only the burden of short-term labor and material costs while shifting the less obvious social and environmental costs to the general public -- or I should say future general publics. We must develop an effective means of factoring these long-range costs into our business decisions by making them part of the corporate and social cost structure.

My saying these things may come as something of a surprise to you because of the role traditionally imputed to the Secretary of Commerce as the spokesman for business. I want you to know at the outset that I do not see my job that way at all. It is true, certainly, that those of us at the Commerce Department spend a great deal of time worrying about the condition of American business. That is -- or should be -- a very different thing from functioning as the Washington agent for the business community. My job, as I see it, is to assess the implications of business activity for the rest of society and to encourage that business activity which is positive for the nation while combating that which is not.

Calvin Coolidge, you will remember, contended in that famous remark of his over 40 years ago that "The business of America is business." That was not true then and is not true today. A more sensible formulation would be that "The business of business is America." It is my job to persuade businessmen to see it that way.

Having said that, I hope you will all listen now with an open mind while I sound, what my journalist friends may mistakenly refer to in tomorrow's papers, as "a cautionary note." My cautionary note has reference not to the goal nor to the urgency of the task. Rather, it has to do with how we formulate the problem we face and how we go about reaching the goal. For the way in which we answer the question "How we get there" will probably determine whether we get there.

A Nation of Dr. No's

Let's look at energy policy as an example of the problems we face. Almost no one sees the energy problem in all its complexity, in terms of trade-offs in an interrelated system which -- if pushed from one side produces a bulge on the other. Most look at it in terms of their particular, and I must say, parochial interests. And that kind of thinking can only buy an iatrogenic cure: That is, a cure which breeds problems worse than those it was intended to correct.

As you know, this country faces a severe energy problem over the next 20 years.

One familiar proposal is that we solve our shortage problems by relying on imports to make up the difference. While we may fulfill our energy needs this way, from an economic point of view over-reliance on imports could be disastrous. Imports of oil and gas alone in 1970 amounted to $2.7 billion. The projected annual deficit by 1985 on the energy account -- assuming we import fuels at the level projected by some -- is $25 billion. Given our already serious balance of payments deficit, and the existing monetary turmoil, this by itself should be no insignificant deterrent.

Beyond this, the national security implications of permanent and substantial reliance on fuel imports would be equally unpalatable. The largest clean fuel reserves are located in areas of low political stability or areas where political interests have traditionally been at odds with our own. The danger of supply interruption at the source and risk of adverse price manipulation are simply too great under these circumstances to warrant wholesale dependence on foreign energy sources.

While we are not presently prepared to accept these projections without further study, we have heard it said by some that it will be necessary to import an estimated one-half to two-thirds of our daily oil requirements, to reach the total U.S. demand that has been projected for 1985. According to estimates prepared by the Maritime Administration, this would require by 1985 a U. S. tanker fleet as large as the present fleet of 160 million deadweight tons. To accommodate larger tankers--

the supertankers -- and achieve the necessary reduced shipping costs, the country will need to develop deepwater port facilities which, ironically enough, are opposed by some of the same environmentalists who say we should not produce energy at home as being potentially hazardous to the environment.

You may ask why it is so important that supertankers are employed in the transport of our petroleum imports. It is important to realize that almost 3/4 of the Free World's oil reserves are in the Middle East and, therefore, any oil imports in the future are likely to come from this area. Because of its great distance from the U. S., transportation costs for this oil will become a significant part of the ultimate cost to the U. S. consumer. If the oil continues to be transported in the average size tanker that now calls at our Atlantic and Gulf ports, the annual transportation cost would be approximately 60 per cent more than if it were transported in ships at least five times its size. Even with full utilization of the lower-cost supertanker, transportation would represent 30 per cent of the landed costs of imported oil.

On the other hand, there are those who propose to solve our energy shortages by encouraging greater domestic production through new tax incentives. But here there would be an outcry from others, who already feel grossly overburdened, if subsidies for increased production added to their tax bills. There is a national security consideration here too because it hastens the day when our finite energy supplies will be exhausted.

There are others who insist that the answer lies in the development of nuclear power plants. But there, too, we run into objections from those who point to the environmental threat of thermal pollution and radiation.

There are those who propose that we solve our energy problem by reducing our consumption. While in the environmentalist's construct this may represent an ideal solution, the pains of unemployment and the loss of creature comforts it would carry in its wake, could produce a backlash that could well sweep away all the gains we have made thus far in the battle to protect the environment.

There is no easy solution to our energy problem nor is there an easy solution to our environmental problem. I'm afraid there is no way around the fact that energy costs are going to rise in the future regardless of the course we choose. These costs will take different forms and our goal, of course, will be to minimize them in the aggregate. But it is naive to assume that we can solve a problem of this magnitude by looking at a corner of it through a microscope. Every action has its attendant costs. The solutions will require a careful systems approach if we are to successfully combine the best at the lowest cost.

We are, it seems, a nation of Dr. No's who know for certain what we cannot do, who are transformed into Dr. "I don't knows" when asked to supply clues as to what we can do.

Let me, at the same time, illustrate the importance of admitting that we don't know by telling you a little about some projects in my particular bailiwick. The Commerce Department is a thing of great variety and, as you may know, one of its important responsibilities embraces marine mammals. After a critical review of our information on the Pribilof Islands' fur seals, which I would say with all humility was inadequate, I have announced this Nation's intention to recommend the establishment of St. George's Island (one of the two main Pribilofs) as a control area to ban the commercial harvesting of seals. This will permit a critical and experimental evaluation there that will guide us toward the soundest possible fur-seal conservation program.

Another major concern is the killing of porpoises incidental to the taking of tuna. The retail value of our tuna fishery is $600 million to $700 million. The fleet is valued at $400 million.

But 315,000 porpoises died in tuna nets in 1970 and 205,000 in 1971. The National Oceanic and Atmospheric Administration in the Commerce Department has undertaken a program designed ultimately to eliminate porpoise deaths. And NOAA, after an intensive study, which has just been completed, is planning research programs in fishing gear development and biological studies that will help attain that objective. The industry itself is testing nets with smaller-mesh webbing which makes it more difficult for porpoises to become entangled.

What has impressed me in studying the fur-seal and porpoise problems is how little of the hard information needed to make an intelligent systems decision we have. We know almost nothing, for example, about porpoise population dynamics. It is illustrative of the cloud of ignorance that dogs our every step in attempting to construct "solutions" to environmental problems. You can't shoot from the hip. Simplistic solutions are dangerous. You can meet yourself coming around the corner with an upraised hammer in your hand.

Likewise with energy, decisions made primarily for environmental reasons, or for tax reasons, or for security reasons or for transport reasons, and which affect business generally, all have an enormous impact on our ability to supply sufficient energy. The problem is that the immediate considerations in each of these related fields always seem more important than considerations that will not have an impact for another few years. History suggests that only when there is a brownout -- or some other dramatic event -- can the people who make energy their primary business get the attention of those who make tax policy or security policy or environmental policy or transportation policy their primary business.

It is not possible to address one part of an interrelated problem without addressing all other parts. We are all concerned about our ecosystem. But that contraction stands for eco-nomic system as well as for eco-logical system.

Let George Do It

There is a kind of dream-world quality in the public's perception of what it will take to clean up the environment. For example, over 40 per cent in a recent public opinion survey said they would not be willing to pay anything for cleaning up the environment, yet everyone wants a clean environment. They want all of the benefits but none of the costs.

The "Let George Do It" syndrome thrives in a dream world. It is the "Let George Do It" syndrome that permits simplistic unidimensional solutions to our environmental problems to collect the force of public opinion behind them. They offer simple and absolute solutions. Never mind that they won't work.

Up to now, as a nation we have not begun to reconcile the conflicts between environmental and economic concerns. It is a dialogue of the deaf. The ecologist and the economist are talking right past each other. Too many ecologically oriented advocates, for example, like nearly every form of energy except the ones we have. On the other hand, too often, the industrially-oriented advocate has forgotten that GNP stands not only for Gross National Product, but also for Gross National Pollution.

The one dimensional Johnny One-Note can't really help us out of the fix we're in. What we need is something akin to the Renaissance Man who is accomplished at all disciplines, who is capable of a multi-dimensioned view of the world. Unfortunately, we don't seem to have many Renaissance Men at work on the environmental problem. So we must do the next best thing. And that is we must pull together a multi-disciplinary team that can launch a renaissance man's passionate search for solutions that will match our passionate sense of this problem.

In other words, we have to find a way to transfer the emotion felt on this subject from its present focus on the magnitude of the problem to a new focus on the search for achievable and reasonable solutions.

The present national debate on the environment is one that has produced an unfortunate polarization. If you are for the environment, then you have to be against economic growth and, conversely, if you are for economic growth then you are automatically assumed to be against the environment.

That kind of thinking must stop. A partnership must be formed, a kind of team spirit developed, that will allow an objective search for answers to begin in earnest.

You remember the warning we used to get each year from the urban specialists that we were headed for a long hot summer because of the explosive discontent in the central cities of our nation. We had a few of those summers, you recall. Well, I am predicting now that we are headed for a long cold winter if we don't resolve the polarization between those who narrowly push for energy growth and those concerned about the environment. An energy crisis -- because of the backlash against the environmentalists it might produce -- might lead to a lot of cold and dirty winters.

We had a Manhattan Project during World War II which brought together the ablest men in the field of atomic energy and supported them with all the money they needed to develop an atom bomb. It was a monumental project. That kind of team was also created when the Nation resolved after Sputnik that we would go to the moon.

Now, we must organize a Manhattan Project to head off the energy crisis and, at the same time, to prevent an ecological disaster.

There are glittering technological possibilities for clean energy development, for example. Our current energy research activities are inadequate to the challenge we face. The theoretical opportunities for breakthrough are endless. Clean energy sources may be found in coal gasification. The nuclear breeder reactor offers great promise. Fuel cell research represents another potential source: magneto hydrodynamics and geothermal and solar energy are still other potential sources with promise. Now we must bend our efforts to unlock that promise.

I am not yet prepared to give up hope that science and technology -- under the proper harness -- will not lead us to safe ground. "The intellect is a cleaver;" said Thoreau," -- "It discerns and rifts its ways into the secret of things."

If we can forge a national commitment and if, on that foundation, can construct national environmental policies, national energy policies and national economic growth policies that are coherent and reconciled, one with the other, we may well be able to solve our energy problem and do it without compromising our legitimate national security concerns and without seriously affecting our balance of trade. With such a commitment, we may well be able to clean up our environment without slowing economic growth. This nation has proved many times in the past that it has a genius for accomplishing the impossible. We found it was only impossible for the faint of heart.

It was precisely in the spirit of national commitment that the President issued his energy message not long ago, a landmark statement that I believe history will record started this nation toward a new conception and a new direction. But I know first hand that he thinks the program called for there is just that -- a first step. Much more must be done. Much more is possible.

Implications of Zero Growth

Yet, in the face of boundless possibilities, prophets of doom abound.

Not long ago, you will recall, there was a great deal of controversy in Washington and in the media concerning a little book called "The Limits of Growth" put out by a team of scientists at M.I.T. and sponsored by a group of European businessmen and intellectuals known as the Club of Rome.

The report argues that unless growth in population and in industrial output are halted very soon-certainly within this century-we will exhaust the planet's ability to provide natural resources for industry, yield food for mankind, and disperse pollution in ways which do not shorten or destroy life. It contended that the eventual crisis will result in the collapse of industrial society.

Many of us have recognized for some time now that growth in population cannot go on forever. But the Club of Rome contention that the time is at hand for also halting economic growth has been accepted by some a little more readily, I'm afraid, than it would be if its implications were fully understood.

Let's consider what some of those needs are and what meeting them without economic growth would imply.

It may come as a surprise to some of you that over the next decade we must generate 16 to 20 million new jobs in our economy or face much higher unemployment.

We could meet the goal of zero or limited growth through cutting the work week and the earnings of individuals presently employed. A lower standard of living for those now in the work force is the cost which might be borne if new jobs are to be provided in a zero-growth economy ... but whose standard of living are we talking about? Do you know of any volunteers?

Another area where zero economic growth would present us with difficulties is the continuation of government services at the current level. If these services are to be maintained at the contemporary level, over $25 billion in new Federal funds must be found over the next four years. We are accustomed to gaining new funds needed through economic growth. If, however, we opt for zero growth, we have two difficult options. We can either increase taxes or drastically reduce per capita services. Do we have any volunteers? Neither alternative seems politically very palatable.

Some of our citizens apparently assume that we have only to tax business profits more heavily to provide Government with new resources for meeting additional tasks they would ask it to perform.

The public has some astounding notions about the amount of profits that corporations have at their disposal to cope with these problems. A survey done for the White House Conference on the Industrial World Ahead this year showed the public's median estimate of the manufacturing profits in the United States was 28 cents on a dollar of sales after taxes.

This estimate was seven times the actual 1970 experience, and almost three times the 10% return which the public estimates as "fair."

At 28 cents on the dollar, corporate profits would be $300 billion. Even at the "fair" return of 10 cents on the dollar, profits would be over $100 billion after taxes. That's a lot of income to redistribute.

But, unfortunately, companies don't make 28 cents on the dollar, or even ten cents on the dollar. They make more like four cents. Total corporate profits are about $47 billion after taxes -- higher than in most other major industrial nations.

If the fat cats were only as fat as people think they are, we would do wonders.

Growth as a Safety Valve

That leads us directly to one of the most significant implications of a zero growth economy. It would change our politics fundamentally.

Many of you in this audience are familiar with the game theory concept of a zero sum competition. Briefly, a zero sum game is one in which every gain by one player must result in a loss for another. Our politics have never been that sort of competition.

Economic growth has meant that each year the resources available for meeting needs of our citizens have increased. Seldom does a group which successfully makes claims for new or increased funding do so at the expense of some other group. As a rather melancholy rule of thumb, funding levels once established are not subject to cuts unless circumstances change greatly.

Now, I know that this is an oversimplified summary of the politics of resource allocation in America, but it does illustrate a crucial fact. Economic growth has for many decades been a safety valve in this society. It has made it possible to respond positively to new claims upon Government without drastically revising previous funding decisions, and challenging existing constituencies.

With zero economic growth, the safety valve is shut off. We revert to the politics of the zero sum game.

Anyone familiar, for example, with the plight of our cities, and the education and welfare needs of the poor, not to mention the requirements of ecology, knows that realistically we must find ways to do much that we are not now going. The acrimonious politics resulting from attempts to cope with the many valid claims of Government in a zero growth environment would make the political battles of the sixties seem nostalgically placid.

We must ask ourselves two questions. First, dare we grow economically? Second, and I think more relevant, dare we not?

The Club of Rome prognosis is that we no longer have the option to expand our economy vigorously, if we wish to avoid the collapse of civilization in anything resembling its present form. If that is right, then the negative implications of zero growth that I have specified here today are not sufficient reasons for rejecting it.

My point is that we must be very sure that zero growth is a necessary option before we embrace it as policy. Each of us will pay harsh costs in terms of the kind of lives we lead if the M.I.T. model of the future is valid. It is imperative that we understand that halting economic growth is serious business indeed.

Growth as the Cure

Cleaner production methods will be available, for example, only if the technology is available. The technology will be available only if investment is made in environmental research and development. Further investment is required in the control equipment itself.

Increased investment requires increased saving. The level of saving can be increased only at the expense of consumption. Thus, the magnitude of the costs we must incur for environmental improvement dictates that consumption must decline if the economy is not growing.

Only a growing economy can provide the investment funds necessary to carry out research and development for the environmental technology that will be needed to do the clean up job.

Only a growing economy can provide the investment funds for pollution control equipment. Only a growing economy can provide these investment funds without a sacrifice in consumption.

In short, only if the economic pie gets bigger will the slice that is needed to improve the environment be sufficient.

And only if the pie is big enough will the nation be able to reach all its other goals.

The choice, then, is not between growth and improving the environment... but rather between the economic strategy that will enable us to meet the costs of an improved environment and one that won't.

I think I have made it clear that I am skeptical that The Club of Rome thesis will be supported by future developments. I believe, in particular, that it seriously underestimates the possibility of technological solutions to the problems of resource depletion and pollution that it projects ... once we all focus on the new questions it suggests. It is hard for us to understand that in the innovative process, inventing the problem can be as important as inventing the solution.

Focusing on the Future

What is clear to me in all this is that we must do a far better job of forecasting the future costs of today's decisions. We must find a way to require those who make today's decisions to assume the responsibility for tomorrow's costs -- rather than burdening those who come after us with problems that by then are almost sure to have grown unmanageable.

The Club of Rome has done us a great service in that regard. They have asked some important questions about the future. They have forced us to consider trade-offs.

Of all our institutions, Government is one that has special difficulty in focusing on the future for it is bound by elections to a very regular, short-term timetable. In order to survive, any Government has to think a great deal about the next election. And that leaves precious little time for thinking about the next generation. It is a system that seems almost to have been designed to prevent a future orientation. In the main, our approach to the future has been to assume it will take care of itself.

Managing the future is of course a challenge every modern institution faces. Since not too long ago I was what some might call a narrow-minded businessman -- (of course, to many that's a redundancy; all businessmen are narrow-minded) -- there might be some useful analogies from the world of business. I do notice some important differences between the way Government approaches the balance between the short-term and the long-term, and the way many of our best managed enterprises do.

One yardstick I have found useful in assessing the real strength of a company, for instance, is how much time its very best people could devote to the future. Wherever I saw most or all of the company pre-occupied with today's and next month's, and even this year's problems -- very frequently, I found, it was an enterprise either that was in, or was headed for trouble.

Conversely, the best-managed corporations, I found, invested substantial amounts of their most precious resource -- the time of their top managers -- in the future; projecting the future; defining the problems and the opportunities of the future; and deciding how to best shape the future instead of being shocked by it. As Louis Pasteur said: "Chance favors the prepared mind."

Before Procter and Gamble decides to put a new detergent on the market it does exhaustive market tests. If Procter and Gamble can do that with a product designed to clean up your shirts, why can't the United States Government test policy options intended to clean up the environment?

When we make environmental policy decisions, we ought to make them with a good estimate in hand of what the impact on the economy is likely to be -- not in order to give ammunition to the temporizers but in order to distribute the costs equitably.

And the costs will be high. The council on Environmental Quality in its most recent annual report estimated that it would cost $287 billion during this decade to do the environmental clean-up job that is necessary. Of that total, $93 billion would go for required new capital equipment and the remaining $194 billion for operating costs. This estimate included not only the costs of cleaning up our air and water but also the costs of developing protection from nuclear power plant radiation, taking care of our solid waste disposal needs and reclaiming land scarred by strip mining.

Must Be Aware Of Trade-Offs

Part of our "systems" consideration is that investments of that magnitude in pollution control will have an impact on U.S. productivity. Some economists have estimated that the expenditure of such sums will have a negative impact on productivity gains of around 0.3 percent a year over the next 4 years. A study by Chase Econometrics Associates, a subsidiary of Chase Manhattan Bank indicated that by 1976 real output per man hour would be 1.2 percent lower because of pollution control. However, that shortfall would drop to 0.1 percent a year in the last 4 years of the decade, the Chase men, predicted. Economists at The Brookings Institution have come up with similar figures.

The Chase economists estimated that it would mean that real GNP by 1976 would be $13 billion less than a projected GNP in constant dollars at full employment of $954 billion and it would mean an increase by a tenth of a point from their projected 1976 unemployment level of 4.4 percent. Now, they go on to say, that by 1980 the impact on GNP will have moderated somewhat, but that is based on an assumption that the major part of the clean-up job will be done between 1973 and 1976.

We ought to be as certain as we can at the start that we will get what we pay for because a $13 billion bite out of the GNP is a big price to pay just to exercise -- or exorcize, if you will -- our passions. Too many programs in the past have started with passionate intentions and 10 years later after billions had been spent we have found they didn't achieve their purpose because they didn't follow the right approach. The way to avoid that is to be aware of the tradeoffs you are faced with when the program is designed and launched.

While reduced productivity will have immediate impact on the supply of domestic goods and services, it will -- through its impact on our international competitive position -- have a negative impact on our standard of living and jobs.

In the world economy, we are no longer the easy leader in a slow field. The U.S. competitive spirit is suffering from middle-aged spread, while the rest of the world has grown strong and sinewy.

U.S. exports of manufactured goods in the decade from 1960 to 1970 showed less growth than that of any of the other major industrialized nations except the United Kingdom.

To a large degree, achieving full employment will depend on our ability to compete in a changing world economy. And that, in large part, will depend on our economy's rate of productivity growth. In the last half of the 1960's, the productivity of American manufacturing increased only 10 percent. During that same period, productivity in France jumped 37 percent, 43 percent in Sweden, 49 percent in the Netherlands and 91 percent in Japan.

By its very nature, a systems approach would crank the costs of reduced national productivity into the calculations that produce a national environmental program, much in the way an aeronautical engineer cranks in estimates of wind friction in shaping the wings and the fuselage of an airplane.

Putting Growth To Work

The President's Government reorganization plans are aimed at redesigning the Federal Government in a way that will emphasize the systems approach. He has, as you know, proposed as one element a Department of Natural Resources to coordinate resource development. Right now, the President's Domestic Council has undertaken a comprehensive study of the energy problem -- that is aimed at a coherent energy policy that considers together the economic, environmental, technological, balance of payments, and national security factors.

We in this Administration have not been twiddling our thumbs and if the Seventies come to be known as the "environmental decade" as some have predicted, it will be due in no small measure to the efforts of President Nixon and of the man who led the list of speakers at this symposium, Bill Ruckelshaus.

But, obviously, we have much to do and little time to do it in. And lest you have misunderstood, I want to make it clear that I am not arguing for a go-slow approach; I am arguing for an intelligent approach to the environmental problems -- one that takes the complexities into account. The economic costs of cleaning the environment must not be used as an excuse for doing nothing, but neither can these costs be ignored. When a policy becomes necessary for the overwhelming public good, the inequities it may produce must be dealt with, but they should not be a reason for deferring that policy.

They cannot be successfully dealt with unless they have been anticipated, unless their real costs have been fully gauged. That is why your measurements, your indices, are of vital importance to us.

I believe we can have clean air and water as well as full employment, adequate energy supplies, a healthy trade balance and an equitable tax structure if we can close the knowledge gap through research and development. The possibilities are there if only we can unlock them, if only we can develop the right combination of men, money and organizational framework to do the job.

We must unlock them. We really have no other alternative. We must get on with the job of forging a national commitment, a national partnership, to save our evironment, while at the same time building a better and richer life for our people.

Davis B. McCarn
National Library of Medicine

Ladies and Gentlemen:

I would like to begin by making sure everybody knows what the National Library of Medicine is: it is the largest library devoted to a single scientific discipline anywhere in the world, and I believe it has been in the forefront of the development of mechanized and improved information systems for at least the past 100 years. I'd like to talk, though, not from the point of view of the National Library of Medicine today, but more from the point of view of an overview of where on-line systems and networking seem to me to be going. I'll come back and talk briefly about the service we provide from the Library of Medicine, but I think in the long run it is more important to talk about where this whole kind of activity is going.

I believe fundamentally we are now at a lift-off period in the development of information systems. But there were prerequisites to the actual building of nationwide information services for both professionals and the public which are now at the point of being satisfied, and I would like to try and document and discuss that point of view. The first of the prerequisites was that there be good information retrieval systems. In point of fact there have not been good information retrieval systems until quite recently. As you may know, timesharing itself came into existence only about ten years ago with the development at System Development Corporation and at M.I.T. of time-sharing computer systems. We have seen the burgeoning in the last ten years, then, of an immense industry in the United States providing on-line computing services. These services have been primarily computational with some small data handling capabilities; they have not been for large information storage and retrieval problems. And that's been for a very simple reason: the smaller problems, the computational problems, were easy to solve on a computer and make available through time-sharing systems to many users in any one city or even in a multiplicity of cities. The problem of providing access to a large data base, however, has been substantially more difficult. The first experiment that I know of in an on-line bibliographic retrieval service was run in 1965; therefore, the actual beginning of bibliographic retrieval was sometime back shortly after time-sharing began. By 1968 there were a variety of services already in existence, many of which you can see in their present form downstairs in the exhibit area, including those of Roger Summit at Lockheed, the Dialog System converted into the Recon System of NASA; the Mead Data Central System, that provides access to legal information; and the system that has grown into the system now existing at the National Library of Medicine. In the time period that we have seen this kind of growth, beginning with NASA information retrieval systems, we have also seen a substantial concentration on the computer problem of information retrieval.

There has been a lot of work on just how the computer can be used effectively to store and retrieve information. There has been a lot of theoretical work; there has been a lot of experimental work. There has been a lot of controversy in the computer industry between full text versus term searching, on how should we do information storage and retrieval. We have seen a lot of emphasis on very complicated retrieval systems that would do a multiplicity of things and fool the user--do things that he had no idea they were going to do for him, and they perform sometimes in very odd ways. I think some of that is changing now. I think we have seen inadequate attention to the problem of communications and providing services at a distance. We have also seen inadequate attention to providing service to a variety of users or multiplicity of users from one computer system. The systems I have been discussing that began in the late 1960s typically could handle from eight to twelve simultaneous users on standard, medium scale computing systems; that's not very many users. Certainly not comparable to the time-sharing services that have been available; it's certainly not in line with what would be necessary to provide a viable commercial information service. I'd like to talk, now, about what actually is running at the National Library of Medicine in terms of what we think is an example of where an information service is going. When we first began, we began with our experimental service, which was alluded to in the introduction, called AIM-TWX, the Abridged Index Medicus via the TWX network. As we saw it, the production of a useful computer information service required three basic fundamentals. The first of these was a data base that somebody was interested in. That's not a trivial problem. It turns out there are lots of data bases and there are lots of ways to structure data bases--some of which we actually tried--that nobody wants to look at; there is no requirement for an information service that does not have a useful data base. The second major problem was to build a retrieval system that could be used by almost anybody, not just a librarian, and certainly not just the programmer, but hopefully by any of a variety of users who required this kind of information. The third requirement as we saw it was some way of providing access to the data base--the networking problem. How can one have access to an information service without immense expenditures in terms of terminal equipment. Some of these early systems, such as the NASA system, cost $10,000 for the terminals. The Library of Medicine did not have the money to set up 60 terminals around the country at $10,000 a copy. The solutions on AIM-TWX, I think, are implied in the title. We made the data base of the Abridged Index Medicus, which was the top 100 journals in clinical medicine, available for searching. Through iteration we built a retrieval program which we thought was efficient and effective, and the TWX portion represents the solution on the communications side that we adopted, which was the connection of the computer to the TWX network, a completely separate network from the telephone network in this country.

That was the biggest mistake we made in the development. It turns out that TWX is much too expensive a form of communication and that there are substantially improved ways of communicating with the computer. The service became available in mid-1970 so that it has now been running for roughly two years. It immediately demonstrated a variety of things to the Library, one of which was that there is a tremendous demand for on-line information retrieval systems. In many locations, it demonstrated the demand was not by the same clientele that had been using the library, or had been interested in information services in conventional forms. We found that our biggest users were hospitals. Of the top 11 users on AIM-TWX, seven were hospital locations, and it was the staff of the hospital, who had never been going near the library before, that was actually using the service. The ability to get answers in five minutes from the retrieval system provided a capability that had never before existed. Based on that experience, the library went ahead and installed on its own computer the service that is now called MEDLINE (Medical Literature Analysis and Retrieval System On-Line), which is on exhibit downstairs, and I hope that many of you have seen it. It operates on a 370/155 computer at the National Library of Medicine. We have access to that computer through the direct dial telephone network; through the TWX network; by Western Union Datacom lines, which provide access to three major urban areas; and finally we are connected to the network of TYMSHARE, Incorporated, which is a network covering some 35 cities all over the country. I'd like to expand on that phase of our system--the network activity.

It is possible in any one of those 35 urban areas to call a local telephone number and with the appropriate set of codes run an interrogation against the computer at the National Library of Medicine. That means there are no long distance charges; it means there are no special terminal requirements, as any of a variety of terminals will work on the system; it operates at reasonable speed, 300 words a minute, which is about as fast as you can read; and, in fact, the access through that network provides reduced communication costs both to the person using the system and in total. The total cost of communicating a search through the network is roughly $1.25 compared to $4.50, the cost of the average long distance call, so that there is a factor of at least 3 in the cost that's saved, to all concerned, the public and the government through connection to the network. The service itself runs 43 hours a week. Most days it's 10 A. M. to 4 P. M. (Eastern times), Wednesdays and Thursday, it's 10 A. M. to 9 P. M., and on Saturdays from 12 to 3. The data base for the service is now nearly 500,000 citations from the biomedical literature, from over 1100 journals, so that it is a substantial data base that's being searched. The system performs reasonably well. Our average performance right now is a response time of less than 4 seconds. We're shooting for keeping the system so that it has less than a ten-second response time. I don't know whether that's realistic; ten seconds may be too long to ask people to wait for answers on computer terminals.

I'd like to come back now for a moment and talk more about the network itself. As I indicated, it reaches some 35 cities right now. In addition to the U. S. cities, as of September 1972, there was a network node installed in Paris, and since the 20th of September, a medical research institution in Paris, which is our foreign MEDLARS Center in that country, has been using it directly for several hours every day. Yesterday we completed a demonstration for all of our European collaborators in Geneva and ran for several hours through that same connection, so that we are now in that same network operating at the same communication cost to us on an intercontinental basis.

Who are our users? The first users of the MEDLINE service were the Regional Medical Libraries that are supported by the National Library of Medicine. They're another kind of network, a cooperative network, which shares resources and shares collections. That kind of network is also operated by the National Library of Medicine; it is focused on some 11 regional libraries that have specific regional responsibilities in the United States, and coordinate the activities of this bibliographic retrieval service that runs from NLM. In addition about 75 per cent of the medical schools in the country are users of MEDLINE. Several hospitals, other medical school libraries, many Federal institutions are also users--we now have 120 institutional users of the MEDLINE service all across the nation and about 250 terminals which have access to the service. We are operating at an average of between 20 and 25 users simultaneously. The fact that we have a distributed network means that anybody can access it when they need it--there are no dedicated responsibilities within the system--but in addition it means that not everybody is using it at once. Fortunately for us that means that we usually don't have more than forty people simultaneously even though we have some 250 terminals that could be accessing the system.

How has the system grown? One way to look at it is in terms of the off-line print capabilities. You can sit at the terminal and say, "I don't want to see all that on the terminal, please just print it and send it to me." If you do that, we air-mail it the next day and you probably get it the day after, so that within three days you would have a printed listing rather than an on-line listing at the terminal. In November when the system first was operational, we ran about a hundred of those; by March it was a thousand, and in August there were three thousand off-line prints. There is about one off-line search for every three requests on the system, so that in August we probably ran about nine thousand requests, or searches, on the service. That's roughly how many we were running in a year on two computers against the old batch processing system, so that we are now doing ten times as many searches as we could ever do before under the prior processing system. We think we're operating now at over 100,000 requests a year--we anticipate being able to meet a demand for 200,000 requests per year against the service.

That's the beginning. We will probably have to put the service on other computers; we have planned, as our computer is saturated, to install it on other computers--then users will have an option of which computer to call for using the service. We have continued to run the AIM-TWX service, so that in essence we now have two computers on that network. The library also sponsors a service called TOXICON, toxicology on-line, that is also connected to this same network. A small number of technical data bases in the fields of education and in other sciences are being made available in on-line search nodes on computers connected to the TYMSHARE network. The existence of more than 100 academic based medical libraries in the MEDLINE network and the establishment of a low cost, dial-up link to Europe via the Paris TYMSHARE node, has made it extremely attractive for commercial development of other on-line bases on a common network. Before the beginning of next year, it will be possible to sit at a terminal in any one of 35 metropolitan areas and make a toll-free telephone call (anywhere else you might have to pay line charges) to one telephone number and search, in this case, some six different data bases, all major depositories of scientific and technical information in the chemical, medical, or education areas. In essence, my feeling is that we now almost have a nationwide technical information network through which services of this kind will be available. The systems that the National Library of Medicine has built are the first, nationally available, on-line information services that can be accessed from anywhere in the country without special lines and without special equipment. The fact that they're on a network means that they were part of a first national information service network. The fact that there are two computers on a network means they're the first multiple computer information service network. And probably last but not least, the fact that it's a network has certain interesting other properties. I believe we are the first organization to obtain communication services on a resource pricing basis. That means we don't pay for every three minutes or every minute of connection between a terminal and the user--we pay for the number of characters transmitted between those two locations, so that the amount of information is what's being paid for, not the length of time somebody is sitting at a terminal.

I believe there are a number of constraints that are important to keep in mind about this kind of activity, the first of which is that it is costly; although our service costs only line charges, these other services are going to be more expensive. Typically, time-sharing service costs $10.00 to $15.00 an hour for connection and computing on a computer. Data base storage and retrieval charges seem to be running $30.00 to $45.00 an hour, so that they are about three times as expensive now as time-shared computing. I think there is a second major constraint we need to worry about, and that is the nature of the data bases themselves. Many of the available bases which could be used for on-line services were designed originally for batch processing; they have esoteric structures; they're complicated; they're intellectually difficult to use. I think as time goes on and these services become available we'll see new organizations of data bases and simplicity. However, that's not true now. I think, in addition, some of them are of questionable value. You could probably pick any one of them and find people who tell you it's useless as a service. That's a problem that will probably get decided in the marketplace. Another major constraint and problem in the development of on-line systems is librarian and user attitudes. Perhaps you have seen evaluations of information systems which talk about precision and recall, as though the ultimate goal of the user were to get a list of everything that was exactly relevant and nothing else in his retrieval. That may be true of the batch systems where one often got lists of one, two, or three thousand citations to look at. It may be true in certain research and legal situations where you want all the information that you possibly can get on a given subject. I have heard it estimated that it's probably not true of the typical person approaching an information system in more than five to ten per cent of the cases, so that the continued emphasis on precision and recall is probably irrelevant in the era of on-line systems where one can scan, refine, interact and hopefully pass up anything that's not what he's looking for. A constraint in the area of the introduction of on-line network information services is librarian and user attitudes towards innovations. There are a lot of places where they just don't want this kind of technology. There are libraries where they want to put that new terminal in the head librarian's office and hide it and only allow the high priests to use it rather than allowing the general public to use it. On the other hand, there are places where it's out in the reading room and gets very widespread active use, but it just doesn't happen all the time. In the same connection, as alluded to by the prior speaker, our heritage of the free library is a constraint. As you may all be aware, the heritage of free library and free information services is one that is in serious jeopardy now. It is becoming more and more evident that information systems cost money, the provision of information and library services is expensive, and that some part of that expense is going to be borne by the users of such services. One sees a trend toward payment for services, but the residual feeling that all these services should be free will probably deter the development of national information services. This is compounded generally by the problem that people can't evaluate the value of information. How does one assess the value of an information system? Well, nobody's got any very good answers to that, and having been in a position where I defend information systems, I know that's a hard question to answer. I find it's a question that is often asked of library services, but hardly ever of management information services. Management is quite aware of how valuable information on managerial matters is and never asks what the cost of the information is, but they're quite ready to ask the value of scientific and library-type information.

In spite of these constraints, I believe that we're moving in a specific direction and I would like to make it clear what that direction is. I believe we're moving in the direction of networks; that it will be possible and relatively simple to establish national clientele for information services so that one will be able to assemble a very large group of users for any given system. This has immediate and immense impact, it seems to me, because it means that information services need no longer be geared specifically to one small organization or one university or one element or one geographic area. It means that a mass market exists for information the same as it does for television broadcasting. The existence of a mass market means that we can move toward immensely larger and immensely more efficient and lower cost information systems. It also means that we have a new law that will be operating in information services. We've seen in the recent past many efforts to put many data bases together on one computer and provide a comprehensive kind of service to a user which covers multiple data bases. I believe that what will happen as networking becomes feasible is that this trend will be completely reversed; that the cost, the capital cost, of putting up a data base, will be borne by one computer, and then the service from that computer will be provided to multiple users all over the country. That computer, no matter how large, could be saturated with any one of the large data bases that are available. Thus, we should see a decentralization of data bases over the next two or three years, with a single computer servicing a major large data base. We may still have a few multiple small data bases, but it seems to me that in general the direction we are going is toward dedicated services. I think they'll be big data bases. We've had, as I indicated, both an Abridged Index Medicus service and an expanded service available; one covered 100 journals, and one covered 1,100 journals. I was completely convinced when we put up the larger data base that many hospitals and physicians would really prefer to look at the smaller data base. It was the clinically relevant material, and I thought that they'd rather stick with the smaller retrieval, a faster system, against the larger data base. I was completely wrong; nobody stuck with the small data base. We dropped from 15 users to an average of less than one on the small data base when the large data base became available; the large data base drives out the small data base.

Those, then, are my predictions about where information systems are going -- I think much faster than any of us realize, we are moving toward nationally available information services at reasonable to moderate costs through networks with mass markets. And I think that means an immense amount of planning of library activity and the provision of public services in libraries and information centers throughout the country.

Thank you very much.

Thomas E. Carroll
Assistant Administrator for Planning and Management
U. S. Environmental Protection Agency

Bill Ruckelshaus and all of the rest of us at EPA deeply appreciate the time and effort you have devoted to making these sessions extremely worthwhile. Be assured that your suggestions on how best to mobilize enormous information resources in both the private and public sectors have been closely listened to by those of us in public office. We will study them carefully -- to learn how we can best use the influence of our office in providing the necessary leadership to protect the environment, acting in the public's interest.

It is my privilege to take this opportunity to thank our hosts of this large and distinguished gathering. A special thanks must go to the Honorable Thomas Luken, Mayor of the City of Cincinnati, without whose deep interest in the environment these meetings could not have been conducted in such a warm and friendly atmosphere. We also appreciate the hospitality of Bill Starnes of the Federal Executive Board.

Andy Breidenbach, Director of EPA's Research Center here in Cincinnati, has once more demonstrated his center's activist spirit in seeking innovative approaches to environmental problems. He and his staff deserve a special "well done" for their hard work.

Among the distinguished invited speakers to this Symposium are some of the nation's most dynamic environmentalists. On behalf of the Administrator, I want to thank the Honorable Peter G. Peterson, Secretary of Commerce; Jules Bergman of the American Broadcasting Company, who will follow me and close the Symposium; Mrs. Charles Black of the Council on Environmental Quality, John Townsend of NOAA; Bill Radlinski of the U. S. Geological Survey, Davis McCarn of the National Library of Medicine; and Mayor Richard Lugar of Indianapolis.

Last but not least, to the hard-working moderators, workshop chairmen, panelists, and committees which planned this conference go our thanks for undertaking the burden of the main program and agenda. They deserve a special citation for what has proven to be an immensely productive and stimulating meeting.

I have been tremendously impressed by the very broad cross-section of different organizations represented here at these meetings the last three days. Our hope was that this forum would provide an opportunity for sharing -- a sharing of both common problems and, hopefully, mutually beneficial solutions. I believe there are too few occasions for close interaction between state and local government officials and the "Feds," between citizens and civic action groups and government people, or between academic and research institutions which produce basic information and the larger number of user groups which use that information.

I believe we all recognize that a rigid, universally acceptable definition of "environmental information," or common agreement on the various needs for environmental information are extremely difficult, if not impossible objectives to achieve. Our primary goal here has not been to seek a unanimity of viewpoints, rigid definitions, or the formulation of some impractical or unrealistic consensus on how to strengthen environmental information. Rather, our keystone objective has been far more modest -- to provide a forum for the exchange of views and the sharing of common problems, whatever your professions, affiliations or interests, and to make users of environmental information aware of what is being produced by the sources of this data.

Five or ten years from now information technology, as Bill Ruckelshaus pointed out, could become an area of public concern and protest as grievous and difficult as "the environment" is today. As today's policymakers we must prepare for what has been called tomorrow's largest industry -- information -- from broad, not narrow, perspectives if we are to plan for the effective and efficient utilization of this new technology in the solution of man's pressing priorities.

Many problems impede man's efforts to halt environmental deterioration. These problems feed on ignorance and apathy. This Symposium, as well as the recent international conference on the environment at Stockholm, mark positive steps toward eliminating these attitudes. By increasing the availability of information, we enable man to fulfill his responsibility to improve the environment; we come closer to reaching our goal -- an environmentally safe and clean nation, an environmentally safe and clean world in which to live.

But it is becoming increasingly clear that science and technology alone will not solve all of the problems related to the environment. From all sides we are being exhorted and admonished to listen to the citizen, to you. Few issues in the remaining decades of this century are expected to touch the man in the street so profoundly and in so many ways as the issue of what we do about the so-called "ecology crisis." Indeed, the newly shop-worn phrase "quality of life" is often used antithetically with the environmental crisis. It would seem axiomatic, therefore, that if the private citizen is to understand and grasp the implications of this crisis, he must have adequate information. And this information must be made available to him quickly and in terms he can readily understand. This is your task. This is our task.

At the national level, information must be treated as a major resource -- no less important than dollars, land, rivers, or roadbeds. Information must be available not only to the citizen, but to policy-makers and planners as well. As we have collectively learned here in these past several days, information must be tailored to the needs of the particular user groups which it must serve. How it is organized, how it is processed, how it is formatted and displayed, all have a bearing on its timeliness, utility, and ultimate value. Fortunately, our information technologies have provided us with a tremendous array of tools and techniques to help the producer tailor his information to the user. The fine exhibits we have seen here at this conference provide us with an excellent demonstration of the range of these advanced methods and concepts in information handling. The challenge now is to focus these tools on the prioritized solution of environmental problems.

My sincere hope is that new channels of communication will have been opened up between and among the various groups represented here today, and particularly with those of us in government. It is absolutely essential that the results of research generated from the university and other institutional centers be made available to all levels of government, to industry and to all concerned with solving our ecological problems. Industry must continue in the spirit of free enterprise to seek cost effective ways of applying the new technologies in solution to these problems. Secretary Peterson in his remarks, and Administrator Ruckelshaus, both stressed this central theme -- the need for close collaboration between all sectors of the nation. Finally, the press and publishers must give wide, deep, and thoughtful coverage to successful pollution techniques, citizen-initiated actions, new laws and regulations which affect us all.

Central to this theme of collaboration and interdependence of efforts is the interchange of information. At the federal level, many different departments and agencies have responsibilities for exchanging information on the environment. Dr. Townsend touched on many of these programs. We learned in the presentation and workshop sessions what these specific programs are and what arrangements have been made to avail ourselves of the products and services offered. We hope, through the medium of follow-on deliberations stemming from your recommendations and actions here, to further identify and strengthen these information facilities and resources. And we hope to improve and more closely integrate the entire network of facilities and systems, as well as simplify subscription and other ordering and accessing arrangements.

EPA, with the cooperation of other federal departments, is currently involved in establishing information exchange agreements with other countries, to extend our help abroad. Some of these programs will be reciprocal. We are also participating in many intergovernmental programs within our own country which are designed to accelerate and enlarge the flow of information between national, state, and local levels of government, as well as with the private sector. All three major pieces of EPA's own enabling legislation, the Clean Air Act, the Federal Water Pollution Control Act, and the Solid Waste Disposal Act, contain specific provisions mandating the Environmental Protection Agency to disseminate information and basic data bearing on the quality of our physical and biological eco-systems.

You have heard from other speakers something of the important programs of their organizations. We seem to have no shortage in their variety and number; our challenge seems to be, rather, to tighten the bonds that link them together and improve their usefulness to you, the user.

In summary, the challenge of our information environment is perhaps more difficult to "see" than that of our physical and biological environments. But it is no less real or tangible, and it must be dealt with aggressively by utilizing the most modern and innovative approaches we can devise. Other speakers and discussions in the working sessions have highlighted for our attention the danger that the new information technology may be used to control, manipulate, repress, or otherwise destroy freedom and self-growth. Assuredly these new technologies have inherent characteristics which will influence policymaking -- both the process and the substance of the decisions themselves. It is therefore up to us to identify those influences and channel them into constructive directions. Our challenge seems clear: to reduce and eliminate conflicting data, and to establish handling mechanisms and repositories capable of responding effectively to the diverse needs for information -- diverse in terms of scope, format, timing, and other parameters.

Your deliberations here have identified a wide array of approaches, strategies and concepts which we must now examine under the microscope. All of your ideas have been suggested in a spirit of constructive debate and discussion. Some may not later hold up to rigorous analysis. Many, I am confident, will prove to be extremely valuable. It is up to us now to go forward with your recommendations.

In a few moments Mr. Jules Bergman will take on the not-so-enviable task of summarizing this milestone conference for us. I look forward to hearing him, as I'm sure you do. In concluding my own remarks, I want to thank each of you here present for accepting our invitation; I hope you've found it worthwhile. Speaking for the Environmental Protection Agency, and on behalf of the many other federal departments and agencies who have assisted us in this meeting, I want to express my appreciation for your exceptional efforts to make these meetings the success I believe they have been. My congratulations for recognizing a need for which you have voluntarily shared your time and talent in an initial collective attempt to marshall our efforts for the ultimate collective good.

AN AGENDA FOR PROGRESS:
NATIONAL ENVIRONMENTAL INFORMATION SYMPOSIUM

Jules Bergman
Science News Editor
American Broadcasting Company

Trying to do a thorough analysis for this symposium would probably take longer than the symposium itself has taken up-to-date. And obviously there is not time for that. Obviously you are all tired and probably have been satiated by too much in the last three days. But I thought I'd make a few points that may or may not be helpful. First of all, trying to be or to fill the role of an objective summarizer for a conference like this, which is what the requirements stated, is a little bit like a drowning man thinking he might begin taking swimming lessons if he could just do it all over again.

And I cannot be an outsider looking in nor an insider looking out, as the program called for, because there are really no longer those distinctions nor those kind of people in our society today or in this world. We are all both insiders and outsiders--God help us--and we are all drowning aboard a foundering planet unless we learn to act and act together. Too often what is going on is a non-dialogue or as Commerce Secretary Peterson put it earlier this morning a dialogue of the deaf with ecologists, economists, government officials, industry, and those of us in the news media or business talking right past one another. All primarily for the lack of facts; facts objectively reported, using new types of information methods perhaps or replaying old-fashioned types that are applied for the first time in this generation with a terrible sharp scalpel, if you will, the scalpel of truth applied anew. Truth not blurred by generality, with specifics not given a back seat to fit a format, a speech, a conference, political objectives or anything else. And the time is now.

There is a climate of controversy, confusion, and often outright hysteria compounded by exaggeration in this country that has brought us to a crisis I submit in intelligence, in confidence in ourselves; a crisis of credibility to where we are near totally disbelieving one another in this country--the media and the government, the people in the government, and sometimes the people in the media. There is an environmental crisis as we all know. It is both worse and better than the way we all think it is and it is going to get a hell-of-a-lot worse if we don't learn to use technology and learn to start talking to one another.

The day's news sometimes leaves those of us in the news business ourselves feeling so stupified, outraged and so helpless that it reminds me of the story about the 91-year old Australian farmer who was asked for his views on homosexuality, and replied, "they used to hang men for it in my grandfather's day; in my father's day they put people in prison for it; now, it is permitted. Well, I want to get out of here before it becomes compulsory." Or as one of my researchers puts it "remember it's always darkest just before it gets totally black."

Well, there is no question we are at a crossroad of credibility, if you will, in this country. A crossroad where we can truly tackle what has to be done with a series of super Apollo programs, if you will, to save our environment, to rebuild our cities, or a crossroad where we can cop out and watch the world crumble in half truths, broken promises, and exaggerations from politicians who don't care.

The quest for a decent world and decent environment--a livable world--is the quest of all of us here and of all the people in this country, I think too. Reminds me a bit of Christopher Columbus. When he departed he didn't know where he was going; when he got there he didn't know where he was; when he returned he didn't know where he had been; and he borrowed the money to do it all with. Well, we don't know where we are exactly except we do know we are in deep trouble. We are not sure where we are going except we know there isn't much time to get there and obviously all the money can't be borrowed. It will have to be paid for by all of us and in realistically higher prices for cleaner products. We know too well that cars are going to and already cost more.

Energy does and will cost at least 25 percent more in the next decade. Every item we use; every molecule of our existence is vitally affected by environmental considerations.

As a newsman, I am deeply concerned before we even get into informational exchange and display methodology. I am deeply concerned not to say panicked because we don't have the facts or seldom do; we seldom get the facts. Let me give you a few examples, the Council on Environmental Quality, in its 1972 report issued a few months ago, declared that air quality is improved somewhat but water quality is somewhat worse, and it will cost more to bring both up to acceptable standards over the next decade. Three-hundred billion now, not the 150 billion estimated a year ago or the 80-odd billion estimated two or three years ago. The CEQ report calls for more accurate and timely information on the status and trends in our environment, information needed to shape sound public policy and to implement environmental quality programs efficiently. But realities as we all too well know seldom measure up to intentions. The CEQ report itself is based on air data gathered in 1970, though the report is dated 30 June 1972. Even worse, the report itself fails to break down the hazards caused by individual pollutants. We still don't have an overall index for air quality in this country and a major shortcoming is the lack of knowledge concerning the medical effects of air pollution hazards. Our air pollution indices themselves are still uncertain, not to say scary or controversial.

Water quality is even more confusing. We now have more than 20 thousand measuring stations, but only a small number are equipped to monitor as many as eight of the variables we are interested in. A vastly expanded program of monitoring toxic substances is a vital national need before we can get accurate data for the information outflow we are talking about. We may even be missing chemicals that we should be tracking carefully, so we have to begin to understand what we are trying to do or we can blow the whole bit and lose track of the real goals and objectives. Obviously, what is required is a U.S.-watch or an America-watch even before an Earthwatch program, as advocated at Stockholm, so we can get full-time, real-time data on what's really happening in this country. A U.S.-watch that is scrupulously accurate and can be reported by those of us in the news business with meticulous objectivity--or Lord help us. The sensors and data-gathering devices must precede the informational outflow methodology.

Some of the agony and the arguments we have heard here are the same agony and arguments that reverberate across this Nation. They proceed from the mass confusion of a people who are bombarded with often contradictory statements from Congressional Hearings, environmental groups, self-seeking politicians, agencies trying hard or sometimes not trying hard enough. The original fact lost in all this is so important that it is almost unbelievable by the time we get to it. Well, we have learned, many of us in the news business too often kill stories rather than mislead the public, and that might be a lesson for many of us here. We kill or don't use news items, for example, of promising cancer cures that have worked only on a few experimental animals before we will mislead the public or at least I kill those kind of stories.

Some examples out of the shattered past of the last few years might be useful, though they don't directly apply full-time to the environmental discussions we have been having. We might look back and reconsider the case of the SST. The SST may be the biggest environmental hazard since the New York City Sewer System and Mayor Lindsey. There's just no telling. It is unlikely to be an environmental hazard at all but you would never know it by what proceeded in the Congressional Hearings, in the press and from environmental groups. The SST was killed on a cross of exaggeration, half fact, and hysteria, not real fact.

We might briefly talk about saccharin and cyclamates. FDA killed them and killed their use with a data base so incomplete that the medical profession just laughed at it. There was no real data base and FDA managed to ignore, for example, solid empirical evidence gathered over the last century on the case of saccharin. You might then look at yesterday's paper and consider the banning of hexachlorophene by FDA. Ask your family pediatrician or internist or GP about that or ask any hospital administrator. Hexachlorophene has caused no human fatality in this country that's known. There was the terrible case in France. But by the same token, we could have overdosed ourselves with salt or aspirin, manufacturing quality controls could have gone wild in a Bayer factory or anywhere. But the fact is that 90 percent of staph infections in this country have been wiped out in the last decade by hexachlorophene and hundreds of thousands of lives of infants saved. But FDA panicked over the case of DES where it was too late and it triggered an overreaction in itself and killed hexachlorophene. My point is simple, common sense has to prevail.

We need to begin to effectively tell the American people about what we are using up in our society and when I say We that means all of us, it doesn't just mean people like myself and the news media, it means all of you in government agencies, environmental groups, industry, etc. We need to tell the people the resources we are truly using up, how rapidly we are using them, and what can be done to preserve them.

How many, for example, know a few simple figures that I keep perusing at 3 o'clock in the morning. Figures that came from a speech by a fine man named Pecora, who died a few months ago, from the Geological Survey that his scientists had gathered. That we are now going to use over the next 20 years 6-1/2 quadrillion gallons of water in this country, 7-1/2 billion tons of iron ore, 1-1/2 billion tons of aluminum ore, a billion tons of phosphate, a hundred million tons of copper and so forth. Water usage will triple, energy requirements will triple and by the year of 2000 we will have to construct as many houses and other facilities as now exist in all these United States now. Those are all environmental considerations, yet our people know few of those facts. The news media has been given little of them and has been given less cooperation in most cases by most Federal agencies in developing stories on that.

The era of using up energy on a one-time basis in this country, one of Bill Ruckelshaus' favorite themes, has also largely been ignored by all of us and the news media. Sooner than 2000, Mayor Lindsey is going to have to ban or restrict auto traffic in Fun City, and we are going to have to do the same thing in most of our other cities. Most important, we have to seriously start developing new energy systems not just talk about them, which we have been doing for two decades. How many of you know the simple facts for example or have spread them that 2/3 rds of electrical energy today is lost in the plain act of transmission? That the thermodynamic efficiency of the internal combustion engine is only 10 to 12 percent. The frictional losses of rubber tire vehicles are four times greater than those of rail vehicles. The automobile itself was an accident. The internal combustion engine just happened to happen conveniently and kept on working up to now in most cases. How many of us have brought home to our people the true figures on energy losses from air conditioning and heating in our buildings? How many of us have told our people about the massive quantities of air conditioning that are required for the glass sheathed palaces we build ourselves in our big cities, instead of using more efficient insulation that is available now and preserving resources for our children and generations beyond them? How many of us have really talked about new sources of power, not just geothermal energy but collecting power from satellites and beaming it to earth via microwave dishes as microwave energy. I guess my point is simply that I don't think any of us have done an adequate job. We have dealt too often in shattered, battered fragments of exaggeration-and sometimes not in exaggeration but too often in shattered specifics-and lost track of the whole. And what has happened out of all this is the destructive climate that has prevailed over this country, and I see it everywhere I go on stories and speeches: a new climate of hysterical disregard for the technological needs and the human needs of this world has sprung up in this country. It is obviously a world that would starve and succumb to disease if we tried to return to things the way they were a century or two ago.

The phrase I like first comes from that favorite maverick of mine, Admiral Rickover, who warns of a new era of McCarthyism if we wipe out the technology we need to control pollution and better our environment, instead of harnessing that technology. The point is that the technology now in danger of being wiped out is neutral. As Rickover beautifully put it, "half truths are like half bricks, they can be thrown much further." Too often the American people have been left confused without knowing where to go by all the facts that we have thrown at them. I would like to read you one paragraph which is a distillation of a survey sociologists made that reads, "Deep in our crisis in this country is the individual's fear that he has lost his identy as well as his power to do anything about what's happening to him. He feels hopelessly trapped in an ocean of polluted air, jammed roads, run-down houses, and broken promises. Promises that now have to be kept." Well, the great hope is that perhaps we have begun to discover some of this in time and in many cases perhaps because of the news media---that same media, especially television by the way, that's accused of distorting the news and sometimes does by accident or mediocrity, seldom by intent. Well, that same media may just have saved us by focusing attention on all of these crises in time, before they knock us out of the ball park completely.

In closing, I would like to deal briefly with the specifics that I distilled out of the brief time I had at this conference and the reason I am doing it this way is I only had a brief time at this conference, and I refuse to distort the few things I learned. Obviously, this conference has to be the beginning not the end. I think EPA is to be commended for having the foresight to gather all the people here. What is needed obviously are follow-up conferences like this with more time to plan the actual agenda, and more time to plan where things actually should go. Obviously new informational display and distribution methods are needed in this country. The U.S.-watch I referred to should in prototype be an information display that can be computer-fed or CRT-displayed in TV stations, radio stations, newspapers, libraries, schools, where anybody can crank in the actual information on the environment they need. It will be costly but I submit it will probably be worthwhile because it will bring our people back in touch with what's really happening in this country and begin to restore to them the sense of belonging, the sense of identity too many of them are missing, and will convince them they are not third person pluralistic fragments floating around in polluted air. So new informational display methods are required. Beyond that the task is the job of four or five or six conferences to lay out the specifics in terms of fine-grain medical knowledge that has to be distributed, in terms of eliminating the duplication we occasionally indulge in as Bill Ruckelshaus referred to it the other day and some of the other speakers have.

You know, we are working on the prototype program for a new science series that we hope to do with MIT, Humanistic Science, and the first show we will probably need to do is on human communications, if you grant there is any such thing, sometimes we wonder. The producer of the show and myself as technical advisers made ourselves up five sentences that are watch-words on how to proceed which I will read to you as I go out the door at high speed. If you can't find the solution, then you are asking the wrong question; if you ask the right question, there has to be a solution; if there isn't a solution, there can't be a question; and if there isn't a question, there can't be a problem; and if you can't find a problem, then you are not asking the right questions.

Thank you.

WORKING SESSION ADDRESSES

SCIENTIFIC AND TECHNICAL ENVIRONMENTAL INFORMATION

AN INTRODUCTION

by

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National Library of Medicine
Bethesda, Maryland

Ladies and Gentlemen: I would like to welcome you to this first session of the scientific and technical information group of the National Environmental Information Symposium.

By way of introduction, let me start with some definitions of scope. Like most of the knowledge that we must have in order to deal with basic societal problems, "knowledge about the environment" does not fit into neat boxes. It is a continuum reaching from the social sciences on one side to the physical sciences on the other. Also, it often cuts across the standard scientific disciplines. The three sessions of this part of the Symposium will deal with that part of the continuum that ranges from biology through chemistry and physics to mathematics.

I would like to use this opportunity to state a point of view which is certainly more a matter of personal bias than provable fact. I believe that even though many of the environmental problems that face us today have been caused by the rapid growth of science and technology during the last hundred and fifty years, the solution to these problems will come mainly through more science and technology. And if more science is needed, then information support for that science is also required, because the scientific information base tells us where science has been and where it now stands, so that it can be decided where science must go from here.

Let me now tell you something about the organization of our part of this Symposium. We propose to present to you a survey or a "shopping list" of information resources in science and technology, which might be required by those active in various areas of environmental work. These potential users need not be scientists themselves, but they require scientific and technical data to perform their functions.

Furthermore, the "shopping list" has been deliberately designed for the ultimate user of the information, rather than the information middleman--the librarian, information scientist, builder of data bases, etc. In fact, the entire National Environmental Information Symposium is arranged primarily to tell this ultimate user about the information support which is available to him and, conversely, to give him an opportunity, in the discussion sessions, to come back to us--the providers of information products and services--and tell us what he needs in addition to--or instead of--these resources we have described to him.

Those of you who are, like myself and my fellow speakers, in the information business, will hear much in these sessions which is familiar to you. But please don't turn off your mental hearing aids, because you might also hear about specialized services and resources that may be new to you and you will certainly be able to contribute much to the discussion sessions by drawing on your own experiences with existing products and services.

Ladies and Gentlemen, I do hope that you will all retrieve a great deal of useful information from this Symposium.

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A SURVEY OF THE BIOLOGICAL-SCIENCE-RELATED INFORMATION CENTERS LISTED IN THE SEQUIP REPORT

(Paper prepared for Presentation at the National Environmental Information Symposium, September 24-27, 1972)

by
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Abstract

For a summary presentation at the National Environmental Information Symposium the author was asked to discuss those information centers concerned with the biological sciences. Since the SEQUIP Report provides a general description of these centers the author conducted two surveys to develop additional data. One survey identified the information provided by the center, who was served and from what resources. The second survey consisted of an individualized inquiry sent to each center in order to evaluate its response. The results of both surveys are evaluated and many significant conclusions drawn; most poignant among them are: 1) a satisfactory response was obtained from only about half of the "centers" contacted, and 2) personal contact will elicit the best response.

SCIENTIFIC AND TECHNICAL INFORMATION CENTERS CONCERNED WITH THE BIOLOGICAL SCIENCES

1. Introduction

Thank you Mr. Chairman. Ladies and Gentlemen, it is a pleasure for me to be here to day to talk about one of my favorite vocations – scientific information centers. I also feel honored to be sharing this lecture period with my two distinguished colleagues Dr. Brady and Mr. Hull. I shall be discussing information centers concerned with the biological sciences, but in order to do so, I would like first to introduce a definition of information centers so that we can all be tuned in on the same wave length. I realize that there is some risk in doing this, as I'll appear much less profound by being clear, simple, and straight forward, but c'est la vie. I have selected as my definition – and there are many to choose from – the one developed by the President's Science Advisory Committee in their report "Science Information and Government,"[1] published a decade ago, to wit:

> "The specialized information center [is] primarily a technical institute rather than a technical library. It must be led by professional working scientists, who maintain the closest contact with their technical professions and who by being near the data can make new syntheses that are denied all those who do not have the [information] at their fingertips. The specialized center should become the accepted retailer of information, switching, interpreting, and otherwise processing information from the large wholesale depositories and archival journals to the individual user."

The significant points in this definition are that 1) the center is led by scientists, and 2) they – the scientists – process the information – not just the documents which contain information. At this point, I would like to call your attention to these significant differences between an information center and a good library. A library, as well as an information center, may acquire, store, retrieve, and disseminate information in the broad sense, but the information center, on the other hand, is constituted to provide technical evaluation of the information thus "processed." Furthermore, the basic unit processed by a library is generally a book, journal, or document; whereas in the information center it would be the knowledge itself, not necessarily the source in which this knowledge is contained. This fact brings us to two other significant characteristics of an information center not explicitly included in the preceding definition: (1) the knowledge which is processed in an information center is "indexed" for retrieval purposes to a much greater depth than in a library, and (2) as a consequence of this processing depth, it is not generally considered practical for information centers to approach the breadth of technical libraries, and in actual practice they have extremely narrow fields of interest.

You will note that I have made no distinction between information centers and data centers. Indeed, as far as I am concerned, "information center" is the general term, and a "data center" is merely a unique type of information center in which the knowledge being processed is in numerical form. So much for definitions. It is the purpose of my talk to discuss for you the information and the related problems and opportunities available in dealing with one class of information centers in the U.S., namely those concerned with the biological sciences.

2. Centers and Organizations Covered

In the organization of this symposium it was decided to have two or three speakers in each of these presentation sessions. In this session we had three speakers and thus the necessity of dividing the subject matter into three areas. My subject area is information centers concerned with the biological sciences; Dr. Brady's area is information centers concerned with physical sciences; and Mr. Hull's includes all data centers. In order to further delineate the bounds of each speaker's responsibility this afternoon, we partitioned the centers listed in the directory contained in the SEQUIP report.[2] For those of you who may not know — SEQUIP stands for "Study of Environmental Quality Information Programs" in the Federal Government. The study was undertaken at a workshop in the spring of 1970. The first draft of the SEQUIP report was distributed in the spring of 1971, a second draft in 1972 and it is expected to be released soon. In any event, the SEQUIP Directory lists a total of 73 environmental information and data programs. Of these the 11 centers that were uniquely concerned with data were assigned to Mr. Hull, 25 dealing primarily in the physical sciences to Dr. Brady, and 29 dealing primarily in the biological sciences to myself. For those of you who are quick at arithmetic, I will add that the remaining information programs in the SEQUIP Directory were obviously not information centers in the context of the previous definition and were therefore not included in our partition.

3. A Study of Information Provided and to Whom

Now I could rehash the information in the SEQUIP report on the 29 centers assigned to me, and I will to some extent. However, in order to develop additional information I prepared a questionnaire and sent it to 23 of the 29 centers of interest here, as well as to 139 other centers of potential interest. A copy of the questionnaire and cover letter are included herewith as Attachment A. I will not report on the results of the larger survey other than to say that exactly 50% (i.e., 81 out of 162) responded. Eight of the inquiries were returned with the notation "Moved — left no address," or "Moved — not forwardable." The response from the SEQUIP Centers was some better, i.e., 65% (15 out of 23 inquiries sent), but still much less than one would expect from true information centers organized to serve the technical community. The results of this survey of the 29 SEQUIP Centers are summarized in Table 1.

It is not possible to say why the other eight centers contacted did not respond. There are at least two obvious reasons: 1) they are not true information centers, and/or 2) they are established to serve a specific mission rather than the technical community in general, or at least, in particular, the technical community represented by my inquiry — which in this case was as a member of the Oak Ridge National Laboratory.

However, analysis of the questionnaire from 15 centers which did respond does provide us with some valuable information on these centers as individual entities, as well as providing us with some interesting insights into the information center business as a whole. The principal points of interest are:

17

Table 1

Characte

(Asterick

No.	Name	Agency	Mission (from SEQUIP report)	Users		
				Indiv.	Univ.	Indus.
13*	Division of Health Effects Research	EPA	Effects of air pollution on health			
14*	Division of Pesticide Community Studies	EPA	Effects of pesticides on health	Yes	Yes	Yes
15	Division of Planning and Research	Dept. of Int.	Compile outdoor recreation projects			
17	Ecological Information and Analysis Center (EIAC)	BMI-AEC	Bioenvironmental and ecological infor.	Yes	Yes	Yes
18	Ecological Sciences Information Center	ORNL-AEC	Environmental pollutants in various ecosystems			
19	Ecosystem Analysis Information Center	ORNL-NSF	Info on biomed program			
21	Emergency Operations Control Center (EOCC)	NAPCA	Provide info to local authorities on air pollution episodes	No	No	Yes
22	Engineer Agency for Resources Inventories (EARI)	Army	Environmental Planning documents			
24	Environmental Hygiene Agency	Army	Support Army preventive medicine program	Yes	Yes	Yes
25*	Environmental Information System	ORNL-NSF	Biblio. references and data on environmental information			
26*	Toxicology Information Response Center	ORNL-NIH-HEW	A response center on the hazards to man due to charcoals	Yes	Yes	Yes
27	Environmental Patent Priority Program Information	Patent	Priority processing of environmental patents	No	No	No
28	Environmental Pollution Effects on Aquatic Resources Program	NOAA	Ecological info on the Columbia River & Puget Sound			
29	Environmental and Radiological Health Laboratories	Air Force	Provide Technical support for Air Force missions involving environment			
30*	Environmental Science Information Center	NOAA Dept. of Comm.	Supervises NOAA's environmental info			
31	Environmental Systems Applications Center	Indiana Univ.-NASA	Provide environmental information services			

B

Characteristics of 29 Biological IAC's Listed in SEQUIP Report
based upon a survey Aug-Sept. 1972
(Asterick denotes Centers which have an exhibit at NEI Symposium)

Users Served					Information Provided								
Univ.	Indus.	Govt. Contr.	Govt. Agency	Other	Gen. Biblio.	Spec. Biblio.	Ans. Inq.	Consult.	Reports	Data	SDI	News-Letter	Other
Yes	Yes	Yes	Yes		Yes	Yes	Yes	No	Yes	No	No	No	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
No	Yes	Yes	No	No	No	No	Yes	Yes	Yes	Yes	No	No	No
Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	No	No	No	No
Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	No	No	
No	No	No	No	No	No	No	No	No	No	No	No	No	

red request to higher authorities for reply

B

C

Data	SDI	News-Letter	Other	Acc. doc/yr	Staff equiv. MY	Charge	Brochure Provided	Remarks
								Not contacted
No	No	No	Yes	3000	4		Yes	
								No reply
Yes	No	No	No	2000	2	No	No	
								No reply
								Not contacted
Yes	No	No	No		5		No	
								No reply
No	No	No	No	100	10	No	No	
								Not contacted
Yes	No	No			6.5	Under consid-eration	Yes	
No	No	No					No	
								No reply
								Not contacted
								Not contacted
								Not contacted
							No	
[illegible]	No	No	No	400	4	No	No	

	Sources Inventories (EARI)		documents		
24	Environmental Hygiene Agency	Army	Support Army preventive medicine program	Yes	Y
25*	Environmental Information System	ORNL-NSF	Biblio. references and data on environmental information		
26*	Toxicology Information Response Center	ORNL-NIH-HEW	A response center on the hazards to man due to charcoals	Yes	Y
27	Environmental Patent Priority Program Information	Patent	Priority processing of environmental patents	No	N
28	Environmental Pollution Effects on Aquatic Resources Program	NOAA	Ecological info on the Columbia River & Puget Sound		
29	Environmental and Radiological Health Laboratories	Air Force	Provide Technical support for Air Force missions involving environment		
30*	Environmental Science Information Center	NOAA Dept. of Comm.	Supervises NOAA's environmental info		
31	Environmental Systems Applications Center	Indiana Univ.-NASA	Provide environmental information services		
32	Environmental Technical Applications Center	Air Force	Provide environmental data	Referred r	
33	Eutrophication Information Program	University of Wisconsin	Provide info on eutrophication of inland bodies of water	Yes	Y
34	Flora North America Program	Smithsonian	Info on vascular plants of North America		
37	Information Center for Internal Exposure	ORNL-AEC	Estimation of dose due to internally deposited radionuclides		
38	Health Sciences Information Center	NIEHS-HEW	Provide info for program planning	Yes	Y
40*	Medical Literature Analysis & Retrieval System (MEDLARS)	NLM-HEW	All info on medicine and related fields	No	Y
45*	National Meteorological Center	NOAA Dept. of Comm.	Analysis and prediction of air pollution potential	No	Y
51*	Nuclear Safety Information Center	ORNL-AEC	Info on safe design & operation of nuclear facilities & handling nuclear materials	Yes	Y
61	Smithsonian Inst. Library	Smithsonian	Characteristics of biota	No	N
62*	Smithsonian Science Information Exchange	Smithsonian	Info on all types of current and basic research	Yes	Y
65*	Technical Information Center	AEC	All national and inter. nuclear science lit.		
66	Technical Information Service Branch	NIOSH-HEW	Info on occupational health & safety		
68*	Toxicology Information Program	NIH-HEW	A response center on hazards to man due to chemicals	Requests t	

Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	No	No	No
Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	No	No
No	No	No	No	No	No	No	No	No	No	No	No	No	No

Referred request to higher authorities for reply

Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes
No	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No
No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Requests to this center are processed by the Toxicology Information Response Center, 26 above

No	No	No	No	100	10	No	No	
								Not contacted
Yes	No	No			6.5	Under consideration	Yes	
No	No	No					No	
								No reply
								Not contacted
								Not contacted
								Not contacted
							No	
Yes	No	No	No	400	4	No	No	
								No reply
								No reply
No	No	Yes	No		4		No	
No	Yes	No	No	700,000	10	No	Yes	
Yes	No	Yes	No	13,000	60		No	
Yes	Yes	Yes	Yes	15,000	12	Under consideration	Yes	
No	Yes	No	Yes	18,000	52	No	No	
Yes	Yes	Yes	Yes	100,000	32	Yes	Yes	
								No reply
								No reply

above

1. Who is served? (Table 2)
2. What type of information is provided? (Table 3)
3. From what information resource? (Table 4)

The survey results on each of these three points is summarized below.

It is not really surprising to see that individuals, without connections, are the least served, i.e., 61%. Perhaps, on the other hand, it is surprising that such a large fraction of the centers will apply their technical resources to the needs of an individual per se. The only other surprise in the matter of users is that while 85% of the centers will serve government contractors, only 70% serve other government agencies.

Table 2. Users Served

Individuals	61%
Universities	77%
Industry	77%
Government Contractors	85%
Government Agencies	70%

There was almost complete unanimity that a center's functions included the preparation of reports. All centers did so (except the Patent Office which has a distinctly different function anyway). This proclivity toward report preparation would be excepted from the very nature and purpose of technical information centers, even if not because, as government entities, one would expect such a product anyway. In addition to report preparation all centers, with two exceptions, answer technical inquiries and provide technical consultation — functions which are commonly expected of them. Most centers (77%) also prepare bibliographies (both general and specific) and presumably provide this bibliographic information as needed in response to specific requests. In fact, many centers have their information files computerized so that bibliographic searches may be programmed to the specific needs of the user. Not surprisingly only 30% of the centers provide SDI. Only one center charges for it's services, but several others are considering doing so. Only 30% of the centers have a newsletter as such, although several others have periodic publications which serve this purpose to some extent.

Table 3. Information Provided

General Bibliographies	77%
Specific Bibliographies	77%
Answer Inquiries	85%
Provide Consultation	85%
Prepare Reports	92%
Develop Data	54%
SDI	30%
Publications	30%
Others	30%

Considering the limited statistics it is difficult to come up with significant numbers in terms of documents processed per center technical staff member, since this number is influenced so greatly by the other work performed by the center. Thus, while the ranges indicated in Table 4 are taken directly from the survey returns, the mean values might better be defined as best-judgment values, where 1/3 to 1/2 of the technical staff time is spent in accessing information and the remainder in the preparation of reports and other services.

In this discussion of response to this survey, it is also noteworthy that only 5 of the 15 centers which responded also enclosed the brochure that was requested. This would suggest that there is room for improvement in the mechanics of our operations to avoid such simple oversights.

Table 4. Information Resources

Documents Per Year		Staff		(Documents Per Year / Staff)
Range	Mean	Range	Mean	
100 to 700,000	~10,000	2-60	10	1000

4. Results of a Specific Information Request

It is one thing for a center to identify the services it provides, and to whom, in response to a survey; it could be an entirely different thing to obtain information under "field" conditions. Therefore, being ihherently an experimentalist and possibly also somewhat of a skeptic, I conducted a little experiment. I wrote to each of the 29 SEQUIP centers assigned to me and presented each with a practical information inquiry within the scope of their center. In order to maintain the objectivity of this experiment, I assumed the identity of a corporate research director doing graduate work on an environmental problem under a corporation scholarship. With the information provided by the centers I was then in a position to evaluate their response.

A typical inquiry is included herewith as Attachment B and consisted of a letter giving my assumed background and interest in a particular area, following which it identified 2 or 3 specific topics and requested three items:

1. a bibliography on each specific topic,
2. an opinion on a specific issue, and
3. a brochure of the center.

I also requested the response within two weeks.

The results of this survey are summarized in Table 5. The number of centers listed there is 27 since I omitted my center, NSIC, (#51), and the Toxicology Information Program (#68), since I was advised that their response would be handled by their satelite center at ORNL's #26 Toxicology Information Response Center. Of the 27 information programs contacted, 4 or 15%, did not respond at all. Of the 23 which responded, the average

8

Response of 27 Biological IAC's From SEQUIP Report to a
(Asterick denotes Centers which had an ex

Table 5

No.	Name	Agency	Date Sent	Date Received	Span	Postage	Inf P
13*	Division of Health Effects Research	EPA	8-4	8-9	5	Govt. 1st	7 doc
14*	Division of Pesticide Community Studies	EPA	8-4	8-21	17	Govt. Air	8 doc bibli
15	Division of Planning and Research	Dept. of Interior	8-10				
17	Ecological Information and Analysis Center (EIAC)	BMI-AEC	8-9	8-15	6	8¢, 1st	Biblio listi
18	Ecological Sciences Information Center	ORNL-AEC	8-9	8-22	13	24¢, 1st	Biblio listi
19	Ecosystem Analysis Information Center	ORNL-NSF	8-10				
21	Emergency Operations Control Center (EOCC)	NAPCA	8-9	9-6	28	Govt. 1st	3 doc. bibli
22	Engineer Agency for Resources Inventories (EARI)	Army	8-9	8-15	6	Govt. 1st	Letter broch
24	Environmental Hygiene Agency	Army	8-10	8-24	14	Govt. Air	Brochu doc.
25*	Environmental Information System	ORNL-NSF	8-10	8-21	11	24¢, 3rd	Several biblic articl
26*	Toxicology Information Response Center	ORNL-NIH-HEW	8-9	8-24	15	32,24,8, 1st	Several and co
27	Environmental Patent Priority Program Information	Patent	8-9	8-25	16	Govt. 1st	List of ents
28	Environmental Pollution Effects on Aquatic Resources Program	NOAA Dept. of Commerce	8-8				
29	Environmental and Radiological Health Laboratories	Air Force	8-10	8-17	7	Govt. 1st	1 repor
30*	Environmental Science Information Center	NOAA	8-10	8-21	11	Govt. 1st	2 bibli
31	Environmental Systems Applications Center	Indiana Univ.-NASA	8-10	8-21	11	37¢, 3rd	Brochur
32	Environmental Technical Applications Center	Air Force	8-9	8-29	20	Govt. 1st	Ref. to source
33	Eutrophication Information Program	University of Wisconsin	8-8	8-15 +9-21	7 43	8¢, 1st 16¢, 1st	List of
34	Flora North America Program	Smithsonian	8-8				
37	Information Center for Internal Exposure	ORNL-AEC	8-8	8-16	8	40¢, 1st	2 report
38	Information Storage and Referral Section	NIEHS-HEW	8-9	8-17	8	Govt. 1st	1 report
40*	Medical Literature Analy-	NIH-HEW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

B

AC's From SEQUIP Report to an Individualized Information Request
otes Centers which had an exhibit at NEI Symposium)

e ved	Span	Postage	Information Provided	Brochure	Sources Requested		Opinions Provided	Evaluation	Reply to General Survey
					Provided	Identified			
	5	Govt. 1st	7 doc. & biblio.	No	Good	Yes	Outside scope	A-	--
1	17	Govt. Air	8 doc. & few biblio.	No	Good	Yes	No	A-	No
								E	No
5	6	8¢, 1st	Biblio. of 3 listings	No	No	Yes	No	C-	Yes
2	13	24¢, 1st	Biblio. of 15 listings	Yes	No	Yes	Outside scope	B	No
								E	--
5	28	Govt. 1st	3 doc., 1 biblio.	Yes	3 good	1 good	No	A-	Yes
15	6	Govt. 1st	Letter with brochure	Yes	No	No	No	D	No
24	14	Govt. Air	Brochure, 1 doc.	Yes	1 fair	Yes	Referred	B-	No
21	11	24¢, 3rd	Several biblio. & articles	No	Fair	Yes	Specific referrals	B-	--
24	15	32,24,8, 1st	Several biblio. and comments	Yes	Yes	Yes	Yes	A	No
25	16	Govt. 1st	List of Patents	No	No	Yes	Outside scope	B-	Yes
								E	No
17	7	Govt. 1st	1 report	No	1 poor	No	Outside scope	C-	--
21	11	Govt. 1st	2 biblio.	No	No	Fair	Referred	B-	--
21	11	37¢, 3rd	Brochures	Yes		A charge for services		X	--
29	20	Govt. 1st	Ref. to other sources	No	No	No	No	D	Yes
15	7	8¢, 1st		No	No	No	No	C-	Yes
21	43	16¢, 1st	List of References	Yes	No	Yes	No	B- E	No
16	8	40¢, 1st	2 reports	Yes	2 good	No	Partially	B-	No
17	8	Govt. 1st	1 report	No	1 fair	No	Referred	B	Yes
17	8	40¢, 1st	Need additional information	Yes		Need additional information		Y	Yes

18	Ecological Sciences Information Center	ORNL-AEC	8-9	8-22	13	24¢, 1st	Biblio listi
19	Ecosystem Analysis Information Center	ORNL-NSF	8-10				
21	Emergency Operations Control Center (EOCC)	NAPCA	8-9	9-6	28	Govt. 1st	3 doc., biblio
22	Engineer Agency for Resources Inventories (EARI)	Army	8-9	8-15	6	Govt. 1st	Letter brochu
24	Environmental Hygiene Agency	Army	8-10	8-24	14	Govt. Air	Brochu doc.
25*	Environmental Information System	ORNL-NSF	8-10	8-21	11	24¢, 3rd	Several biblio artic
26*	Toxicology Information Response Center	ORNL-NIH-HEW	8-9	8-24	15	32,24,8, 1st	Several and co
27	Environmental Patent Priority Program Information	Patent	8-9	8-25	16	Govt. 1st	List of ents
28	Environmental Pollution Effects on Aquatic Resources Program	NOAA Dept. of Commerce	8-8				
29	Environmental and Radiological Health Laboratories	Air Force	8-10	8-17	7	Govt. 1st	1 repor
30*	Environmental Science Information Center	NOAA	8-10	8-21	11	Govt. 1st	2 bibli
31	Environmental Systems Applications Center	Indiana Univ.-NASA	8-10	8-21	11	37¢, 3rd	Brochur
32	Environmental Technical Applications Center	Air Force	8-9	8-29	20	Govt. 1st	Ref. to source
33	Eutrophication Information Program	University of Wisconsin	8-8	8-15 +9-21	7 43	8¢, 1st 16¢, 1st	List o
34	Flora North America Program	Smithsonian	8-8				
37	Information Center for Internal Exposure	ORNL-AEC	8-8	8-16	8	40¢, 1st	2 repor
38	Information Storage and Referral Section	NIEHS-HEW	8-9	8-17	8	Govt. 1st	1 repor
40*	Medical Literature Analysis & Retrieval System (MEDLARS)	NIH-HEW	8-9	8-17	8	40¢, 1st	Need a infor
45*	National Meteorological Center	NOAA Dept. of Commerce	8-9	8-15	6	Govt. 1st Air	1 repo
61	Smithsonian Institution Libraries	Smithsonian	8-9	8-31	22	Govt. 1st	Don't spond
62*	Smithsonian Science Information Exchange, Inc.	Smithsonian	8-10	8-15	5	44¢, Air	Brochu
65*	Technical Information Center	AEC	8-10	8-18	8	Govt. 1st	3 abst 3 rep
66	Technical Information Service Branch	NIOSH-HEW	8-9	8-22	13	Govt. 1st	1 repo 1 bibl

A Responsive and to the issue with substantive material

B Responded to the subject but not deeply

C Response an apparent formality

D Response an apparent formalit

	6	8¢, 1st	Biblio. of 3 listings	No	No	Yes			
	13	24¢, 1st	Biblio. of 15 listings	Yes	No	Yes	Outside scope	B	No
								E	--
	28	Govt. 1st	3 doc., 1 biblio.	Yes	3 good	1 good	No	A-	Yes
	6	Govt. 1st	Letter with brochure	Yes	No	No	No	D	No
	14	Govt. Air	Brochure, 1 doc.	Yes	1 fair	Yes	Referred	B-	No
	11	24¢, 3rd	Several biblio. & articles	No	Fair	Yes	Specific referrals	B-	--
	15	32,24,8, 1st	Several biblio. and comments	Yes	Yes	Yes	Yes	A	No
5	16	Govt. 1st	List of Patents	No	No	Yes	Outside scope	B-	Yes
								E	No
7	7	Govt. 1st	1 report	No	1 poor	No	Outside scope	C-	--
1	11	Govt. 1st	2 biblio.	No	No	Fair	Referred	B-	--
1	11	37¢, 3rd	Brochures	Yes	A charge for services			X	--
9	20	Govt. 1st	Ref. to other sources	No	No	No	No	D	Yes
15	7	8¢, 1st		No	No	No	No	C-	Yes
21	43	16¢, 1st	List of References	Yes	No	Yes	No	B-	
								E	No
16	8	40¢, 1st	2 reports	Yes	2 good	No	Partially	B-	No
17	8	Govt. 1st	1 report	No	1 fair	No	Referred	B	Yes
17	8	40¢, 1st	Need additional information	Yes	Need additional information			Y	Yes
-15	6	Govt. 1st Air	1 report	Yes	1 good	Yes	Yes	B	Yes
-31	22	Govt. 1st	Don't respond to such	No	Referred to SIE			D	Yes
-15	5	44¢, Air	Brochures	Yes	A charge for services			X	Yes
-18	8	Govt. 1st	3 abstracts, 3 reports	Yes	Excellent	Excellent	Partially	A	No
-22	13	Govt. 1st	1 report, 1 biblio.	No	1 good	1 good	Yes	B	No

C Response an apparent formality – some useful material
D Response an apparent formality – little useful material

E No reply
X Charge for services
Y Wanted additional information

time for the initial response was 11 days, with 17 of the centers getting their reply back within the two week period as requested. Two of the centers, i.e., #62 – Science Information Exchange, and #31 – Environmental Systems Applications Center expressed a willingness to provide information, but had a charge for doing so. I did not proceed further in the evaluation of these centers.

My evaluation of the responses was based upon the relevance of the response to the questions asked, the usefulness of the material which was provided (bibliographies and/or documents), and the assistance provided by the center's staff in responding to the technical opinion which was requested. At this point, I would inject a word of caution since I am sure that any other evaluation would come up with a different rating, as the matter is so subjective. Furthermore, one sample from a center is no adequate indication of the overall effectiveness of any center. Hence I would ask that this evaluation be kept in perspective for whatever merits it may have based upon the averages, and for the insight it provides to the problem of information communication.

Nevertheless from the point of view of a prospective user, the response from these inquiries ranged from extremely gratifying in some instances, to very disappointing in others. I have rated half (14) of the responses either A or B which I consider as satisfactory. The other half (13) included 4 which did not reply at all, 2 which charged for such services, 1 which wanted more information, and the remaining 7 from whom the replies were just inadequate. In addition to the bibliographies which I requested, I have received enough documents to start a small library. This apparently came about from two principle factors; first, several centers, which apparently were not equipped to provide special bibliographic searches, sent large published bibliographies, and/or copies of abstract publications; and second, many centers volunteered copies of relevant articles on the subject in question.

Only about half of the replies addressed themselves to the specific issue regarding which I had asked their opinion, but in only a few instances did I have the impression that a qualified technical person had provided me with any real insights on the problem.

I fared a little better this time in obtaining brochures, since eleven of the centers contacted sent same, as opposed to the 5 brochures which were returned in response to the general survey.

Another interesting bit of information relates to the return communiques themselves. Half (14) of the centers responded using official government envelopes for which no postage was required; all of these were first class except three which responded by airmail. Of the other half, most were non-government organizations operating under contract to a government agency, but under such an arrangement they have to pay postage. These responses included two third class mailings and one airmail, the remainder being first class.

5. Discussion

A person with an information need first must find out where he can go to have his need serviced. This in itself is more difficult than it would appear as it involves the answers to several related questions, e.g.,

1. What information centers have a technical scope which includes my need?
2. Do these relevant centers provide the service I desire?
3. Am I eligible to receive services from these centers?
4. Is there any charge for these services?
5. What is the technical quality of the information I receive?
6. How long will it take to get the desired information?

Some, but not all of the above, is covered by the various compilations of information centers which exist and this meeting should generate a more complete and current directory.[2,3,4,5,6] On the other hand, I have attempted here to provide this information for the SEQUIP centers assigned to me. One of the biggest problems in soliciting information, is that the name of a group is often misleading as to its technical scope. Another problem lies in the fact that many groups and organizations whose names are appearing on lists of information programs these days, are not prepared to provide information to the "outside" user and probably should not have been listed in the first place. If you have any doubt about the responsibility of any group it would be better to talk to them first, and find out what they are indeed constituted to do. Again, the information in this paper will give you some insight as to what to expect from this group of the SEQUIP centers.

The concept of talking with a center (or visiting same in person) before initiating an inquiry will in most cases save you time, the center time, and result in a more satisfactory response. By so doing, the user's needs can be best matched to the center's information scope and services, thereby achieving a better result than is normally possible from a simple letter request. Talking with the center not only helps direct attention to the important aspects of your problem, but also overcomes such obstacles as the center's apparent inability to read (witness the previously cited difficulty in getting brochures).

Several centers are automated, thus the incremental cost of providing a user with certain information is minimal. With such a capability, special bibliographies can be prepared in minutes (although a day is more reasonable) and SDI may be routinely sent to thousands of users. In fact, the capabilities of centers are so enhanced by such automation that I would expect it to become an essential requirement in the very near future for all but some of the smallest, most specialized centers.

Most centers neither provide nor sell the documents they refer you to. Hence one should anticipate that the response from an information center will not solve your problem, but provide you with the awareness of the existing tools for the job. The rest is up to the user.

6. Conclusions

1. Not all information programs listed in the SEQUIP report and most other compilations are technical information centers constituted to provide information outside the sponsoring agency.

2. For true technical information centers there are significant differences, as well as similarities, in the users served and the services provided which should be confirmed in some manner before initiating a request.

3. Information responses vary widely and are most relevant and meaningful when the user understands what he can expect, and the center understands the user's needs. This is best achieved by some personal contact (as by phone) in addition to a letter.

4. If we assume the inquiry is directed to the appropriate center and the communication link is such that there is good understanding by both parties involved, a wealth of valuable information, opinions, and insights may be readily assembled. Given the complexity and interrelationships in today's technology, this is one of the principal functions of an information center.

5. Preparation of reports is a common characteristic of all information centers, as are such other services as preparing bibliographies, answering inquiries, and providing consultation. Other information outlets, as SDI and periodic publications (journal, newsletter, etc.), are much less common.

6. In a center of any size, mechanization of the information-base in some form (e.g., computer retrieval) is essential to an effective operation.

7. At the present time all but a few centers provide their services at no charge — if they provide them at all. Charging schemes are under consideration in at least 2 of the 7 other centers which responded to this question, and due to its inherent logic can be expected to become more commonplace in the future.

8. The services of a majority of the centers are available to all comers, although an individual is somewhat less likely (61%) to be served than either a university or private industry (77%), both of which are second to government contractors (85%). The lower service eligibility of other government agencies (70%) may reflect a reluctance on the part of one agency to do work for another.

9. The conclusions and opinions expressed in this paper are mine and do not necessarily reflect those of either the Oak Ridge National Laboratory or the Atomic Energy Commission.

7. References

1. President's Science Advisory Committee, "Science Information and Government," January 10, 1962.

2. "A Study of Environmental Quality Information Programs in the Federal Government," Report of the SEQUIP Committee to the Office of Science and Technology, May 1971 (soon to be released).

3. Z. Combs, D. K. Truby, and J. R. Buchanan, "Directory of Environmental Information Sources," ORNL-EIS-71-5, October 1971.

4. "Directory of Selected Specialized Information Services," Ad Hoc Forum of Scientific and Technical Information Analysis Center Managers, Directors, and Professional Analysis, CONF 651131, November 1965.

5. "Directory of USAEC Information Analysis Centers," January 1972, USAEC.

6. "Directory of Federally Supported Information Analysis Centers," January 1970, Prepared by Committee on Scientific and Technical Information Federal Council for Science Technology, COSATI-70-1, PB 189300.

Attachment A (1)

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX Y
OAK RIDGE, TENNESSEE 37830

NUCLEAR SAFETY INFORMATION CENTER
615/483-8611: 3-7253
FTS 615/483-7253

NUCLEAR SAFETY JOURNAL
615/483-8611: 3-5483
FTS 615/483-5483

August 16, 1972

The Nuclear Safety Information Center was established by the U.S. Atomic Energy Commission to serve the nuclear community by collecting, storing, evaluating, and disseminating information relating to the safe operation of nuclear facilities. Although the technical scope of NSIC has always included a nominal effort on the consequences of effluent releases from nuclear power plants, as of four years ago, our efforts on environmental effects were significantly increased. The complete technical scope of NSIC is shown on the attachment hereto. Over 30% of NSIC's total effort (11 technical man-years) is allocated to the site and environmental categories (Nos. 2, 14, 15, 16, 19, 20, and 21) listed on the attachment. For our users, we frequently undertake special bibliographic searches as well as undertake to provide technical answers to specific questions. In view of the detailed specialized knowledge required to respond to many of the questions, we are frequently confronted with the need of referring some inquiries to more specialized information sources. However, before doing so on a routine basis, I would first like to ascertain from you the nature of the response that such a referral to you could be expected to elicit. This will enable us to best respond to the inquiries we receive and to ascertain that the user is directed to the best information available for his need. It would permit us to direct to you only those potential users that you are in a position to accommodate. Toward that end, I have prepared the enclosed brief questionnaire, which I hope you would be so kind as to fill out and return, together with some descriptive literature on your program. For your information and use, I am enclosing a brochure of NSIC.

Very truly yours,

J. R. Buchanan

J. R. Buchanan, Assistant Director
Nuclear Safety Information Center

JRB:jc
Enclosures

Attachment A (2)

NSIC Environmental Questionnaire

(Please complete and return to NSIC by September 1, 1972)

(1) Does the scope of your activity fall in or include any of the following information categories?	Yes	No
Siting of Nuclear Facilities	___	___
Radionuclide Release and Movement in the Environment	___	___
Environmental Surveys, Monitoring, and Radiation Dose Measurements	___	___
Meteorological Considerations	___	___
Radiation Dose to Man from Radioactivity Release to the Environment	___	___
Effects of Thermal Modifications of Ecological Systems	___	___
Effects of Radionuclides and Ionizing Radiation on Ecological Systems	___	___

(2) Do you provide information to the following users?	Yes	No
Private Citizens	___	___
Universities	___	___
Private Industry	___	___
Government Contractors	___	___
Government Agencies	___	___
Other (explain)	___	___

(3) What type of information do you provide?	Yes	No
General Bibliographic Searches	___	___
Special Bibliographic Searches	___	___
Answers to Technical Inquiries	___	___
Consultation	___	___
Reports	___	___
Data	___	___
Selective Dissemination of Information	___	___
Newsletter	___	___
Other (explain)	___	___

(4) What is the size of your information base and equivalent full time technical personnel?

We access approximately ________ documents per year.
We have a technical staff of ______ equivalent full-time people.

(5) Which, if any, of the above services do you charge for and how much? Please explain.

This questionnaire was completed by ______________________________ on ______________________ for (give complete name and address of center).

Please return to: J. R. Buchanan, Assistant Director
Nuclear Safety Information Center
P.O. Box Y
Oak Ridge, Tennessee 37830

Attachment B

August 10, 1972

Mr. James E. Caskey, Jr.
Environmental Science Information
Center
National Oceanic and Atmospheric
Administration (NOAA)
Rockville, Maryland 20852

Dear Mr. Caskey:

This letter is a request for information with which I understand your Information Center is involved. First as regards to my interest and need, I am Assistant Research Director of Environmental Engineering and Research Corporation (EERC) of Memphis. Since the first of this year I have been on leave of absence to do work on my doctorate at the University of Tennessee. My thesis work is supported by EERC because of its potential industrial applications in the control of liquid effluents. I learned from a colleague that you were Director of the Environmental Science Information Center which was established to collect and evaluate scientific and technical information for the National Oceanic and Atmospheric Administration and outside groups, and that you very probably would have information of value to me by current investigation. I am particularly interested in the following:

(1) Effects of large municipal sewage effluents released in or near the ocean on aquatic plants and marine animals.

(2) Research conducted during the last three years on methods of upgrading these effluents.

I would appreciate receiving a current bibliography on the above topics from your information files, as well as your own evaluation of the most effective methods of reducing BOD in effluents from paper mills. To be of greatest value, I would need to receive this information by August 25. In addition, I would like to get a description (e.g., brochure, circular, etc.) of your Information Center. I appreciate your cooperation and assistance in this matter.

Yours truly,

Thomas B. Cantrell
10433 Grovedale Drive
Concord, Tennessee 37720

E. L. Brady, Talk, NEIS, Cincinnati, Ohio, September 25, 1972

INFORMATION CENTERS CONCERNED WITH ENVIRONMENTAL MATTERS: PHYSICAL SCIENCE AND TECHNOLOGY

The program for this symposium clearly shows that the committee that planned it recognized a high priority for science and technology in environmental problems and their solutions. Science and technology are responsible not only for many, if not most, of the problems of the environment, but they also offer the greatest hope for solving those problems, if applied wisely. However, solving the technological problems of our environment may turn out to be far easier than solving the political and financial problems.

In this session this afternoon the speakers will identify and describe a number of sources of scientific and technological information, concentrating on those sources called "information centers." This term also includes "data centers." First I should explain what I mean by the terms "Information Center," "Information Analysis Center," and "Data Center." They seem to be almost self-explanatory, but experience has shown that unless the audience is composed mostly of so-called "information specialists," they need some clarification. Henry Kissman asked me, therefore, to begin by briefly describing the activities and functions of information centers.

A basic premise of this symposium is that the audience consists largely of users of information rather than information specialists. That is, you are people who are faced with the necessity of solving practical problems connected with the environment, and you need miscellaneous types of information to help solve those problems. As a physical chemist myself, concerned with the problems of effective use of physical and chemical information, I know that the community of physical chemists in this country is only dimly aware of the sources of information that are available to them. I assume that other types of physical scientists and engineers are not better informed, nor are economists and other social scientists.

An "Information Center" is an organized group of individuals who collect documents and other recorded information in a specified field of knowledge, select and store appropriate portions of the collected information, and then use this stored information to provide a variety of services to people who may need it. These services may be abstracts, bibliographies, data compilations, critical reviews, recommendations on new research, or any other output derived from the stored information. Information centers show great diversity in their operational practices and in their policies for charging for their services. For example, some may provide their services free to all comers; some may provide them only to a defined set of qualified users. Some may charge a nominal fee, while others may charge a very substantial fee.

Now I want to define what I mean by the phrase "Data Center," since the word data is one of those words with several meanings and therefore can mean anything the speaker wants it to. By the word "data" I mean the numerical result of a quantitative measurement. Such a result may be, for example, the rate constant for the reaction of ozone with an unsaturated hydrocarbon. Or, it may be the vapor pressure of water in the atmosphere at a specified time and position on the earth's surface. The essential nature of "data" is that they are the quantitative results of a measurement of some kind. A data center then is a special kind of information center, one that collects, manipulates, and disseminates results of measurements.

Now I would like to consider the types of products and services provided by information centers. In Figure 1, I have listed in the left-hand column the sequence of activities that take place within a center. The right-hand column lists the type of output that might be associated with a particular kind of activity opposite it in the left-hand column.

The first activity within a center is collection of relevant information. This procedure usually involves examining large masses of material that may be candidates for inclusion, and selecting appropriate material for retention. The candidate material may be any form of record whatsoever -- formally published papers, government reports, photographs, audio or video tapes, or any record from an instrument. The result of this selection process may be of interest to another person who wants to know what material is available relevant to a certain area. The center may therefore produce a listing, or a bibliography, with the entries organized into a number of relatively broad classes.

The next step within a center is indexing and storing the material. Usually a center will index in much greater detail than is customary in the broad-scale abstracting and indexing services, such as Chemical Abstracts or Physics Abstracts. As a result of this indexing activity, sometimes a highly-detailed indexed bibliography is produced. For example, the National Bureau of Standards Alloy Data Center has produced a detailed index of alloy systems. This index tells the composition of a system, what properties were measured, over what temperature ranges, who made the measurements, how they were made, where they were published, and various other special explanatory facts. Many other centers put out similar material.

The next step within a center is selection of appropriate information and data to use in a particular product. This product might perhaps be a state-of-the-art report or perhaps an uncritical data compilation.

The next stage shown on the figure, that of critical evaluation, is attempted by only a relatively small number of centers. If so, the center is called an "Information Analysis Center." Let me digress to call to your attention a source of information about such centers. This source is called a "Directory of Federally Supported Information

Analysis Centers." It was prepared by a panel of COSATI working closely with the National Referral Center of the Library of Congress. It is available from NTIS, identified by number PB 189 300.

An information analysis center is directed by specialists in the subject matter in which the center is focussed, because only specialists have the sophisticated judgment required to carry out an evaluation in a sufficiently critical manner. These specialists evaluate the information stored within a center and produce new knowledge which contributes to the progress of the science or technology with which the center is concerned. This new knowledge may be a critical review, a critical data compilation, a recommendation, an answer to a problem, or one of the other products shown. I want to emphasize as strongly as I possibly can that this critical evaluation process has always been an essential element in the progress of science and technology. Critical evaluation identifies sources of error, analyzes discrepancies, and compares experimental results with theory. A center that carries out a critical evaluation is not just manipulating documents or data stored in a computer; it is producing new technical knowledge. An information analysis center is a management device for ensuring that critical evaluations are performed systematically and comprehensively.

Most Federal government agencies and many other sponsoring institutions have found that operating an information analysis center, or a whole series of them, contributes effectively to their missions.

For example, the National Bureau of Standards operates about two dozen such centers within the National Standard Reference Data System. The Office of Education of HEW operates 18 information analysis centers, called Educational Research Information Centers, each dealing with some specialized aspect of education — examples of the subjects covered are junior college education, educating the retarded child, and primary school education.

Some centers operate in a discipline of the physical sciences, the biological sciences, or the earth and atmospheric sciences. Others are mission-oriented, rather than discipline-oriented. Many of them provide information and services of great value to people who are trying to solve problems relating to the environment.

With this introduction I can now tell you how we have organized this session today. In the rest of the time allotted to me I will describe a few of the centers providing information services in the physical sciences, concentrating on those centers that obtain most of their information from documents and other written records. Dr. Cottrell will then discuss the centers that are concerned with biological effects, and the interaction between physical phenomena and biological systems, again concentrating on those centers that obtain most of their information from documents. Mr. Arnold Hull will then describe the activities of some of those centers that deal with observational measurements — that is, data — of geophysical phenomena. These measurements are the actual quantitative description of our physical environment and the way it behaves. They include data on weather, oceanography, aeronomy, and many other aspects of our environment. We realize that this is an arbitrary way of dividing up our task; the boundaries are fuzzy and some of the centers that we deal with could just as well be assigned to one of us as to another. However, we agreed that the rationale that we are using is as reasonable as any other we could think of — and more reasonable than some.

My assignment, then, is to focus your attention on those centers concerned with the physical sciences. Much of this information can be found in the SEQUIP report, which I hope will shortly be readily available. The SEQUIP report, for those who are not familiar with it, is the report of the "Study of Environmental Quality Information Programs" in the Federal government, instigated by the President's Office of Science and Technology a couple of years ago.

The National Standard Reference Data System (NSRDS) is first on my list. Its objective is to produce critically evaluated data on the physical and chemical properties of substances for use by scientists and engineers concerned with solving the technological problems of society — air and water pollution, the energy crisis, new materials, solid waste management. This program is administered by the National Bureau of Standards under directives from the Federal Council for Science and Technology and the U.S. Congress.

Table I lists some of the NSRDS publications containing data that are important for environmental scientists. A list of all the publications now available in the NSRDS series can be obtained from the National Bureau of Standards booth at this conference. A status report now in preparation will tell you about all of the other data compilations and critical reviews that have been published or that are under way at the present time. We will be glad to send anyone who wishes it a copy of this status report; just write me a note.

However, the properties dealt with in the Standard Reference Data Program cover only a small part of the knowledge of physical science needed to understand and to protect the environment. Four agencies share the primary responsibility for studying the physical nature of the environment and providing information to those who need it, as well as using that information themselves in achieving their own specific mission goals. These agencies are: the Environmental Protection Agency, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, and the Department of the Interior.

I can mention only briefly some of the activities that appear to me as being of special interest in the areas that I am trying to cover. I remind you that Mr. Hull's review will deal with several of those centers that collect and process data on the physical behavior of the environment. These centers are the principal producers of interpretations and codified knowledge about the physical behavior of the world we live in.

One of the important features of our physical world is the water it contains — resources of water, quality of water, and pollution of water. The Office of Water Resources Research in the Department of Interior has established a Water Resources Scientific Information Center, which has been assigned responsibility to coordinate and supplement the technical information activities of Federal agencies concerned with water resources of all kinds. This Water Resources Scientific Information Center publishes at regular intervals a Water Resources Research Catalog, which is intended not to give results of research already done but to let people know what is now going on. The latest edition describes more than 5000 current Federal, state, and local water resources research projects. This center also publishes a bi-monthly publication entitled "Selected Water Resources Abstracts," containing abstracts of publications from all over the world.

The abstracts and the catalog contain material gathered from the several dozen agencies that share responsibilities in the water field. These agencies are listed in the SEQUIP report. I will mention just a few to give you an impression of the range of organizations involved: Bureau of Mines, National Marine Fishery Service, Bureau of Outdoor Recreation, Bureau of Reclamation, EPA Water Quality Office, and Office of Saline Water. Many agencies that conduct contract research work in the water resources field require the organizations that submit proposals to them to show evidence that the Water Resources Research Catalog has been consulted before they will give serious consideration to a new proposal.

To be sure that it has adequate coverage of the fields of science and technology of concern to it, the Water Resources Scientific Information Center supports a number of documentation centers focusing on highly specialized topics. Typical examples of such topics are animal feed lot wastes, textile wastes, and thermal pollution.

The Office of Water Data Coordination of the U.S. Geological Survey issues a "Catalog of Information on Water Data." This catalog contains observational data on water sources and their quality. I refer you to the SEQUIP report for additional details and lists of agencies that have significant responsibilities in this field.

In the field of air quality and air pollution, the Environmental Protection Agency and the National Oceanic and Atmospheric Administration undertake the largest programs, with major emphasis on data collections. Other projects of these organizations are concerned with biological effects and will be discussed by Dr. Cottrell.

To understand the atmosphere adequately, information is needed on the properties of each molecule to be found in the atmosphere, mechanisms of their reactions with other molecules, and their thermodynamic functions. Additional data are needed on the behavior of the atmosphere on a macro scale -- for example, on the transport of mass and energy through the atmosphere and through the interface of the atmosphere with the earth's surface. Many of these kinds of data are provided by EPA, NOAA, and the NBS Standard Reference Data System.

Probably the most extensive literature services on the properties of air are provided by the Air Pollution Technical Information Center of EPA. This center prepares a monthly abstract bulletin containing descriptions of papers from more than 1100 sources, including journals, government reports, patents, proceedings, etc. This center is also prepared to conduct literature searches and to prepare bibliographies. It sponsors translations of individual documents and a few cover-to-cover translations of journals. This center probably would not be called at the present time an information analysis center, although I believe it comes quite close.

I must mention the Scientific Information and Documentation Division of NOAA because I don't know where else it might be discussed, and I would not want to see it neglected in this symposium. The program of this Division includes library, editorial, report writing, and other documentation services covering much of NOAA's activity. Its total output is important to anyone interested in environmental information, although probably only a relatively small portion of it is in the specific areas assigned to me in this symposium.

Now I would like to mention briefly a sampling of activities in other areas. In solid waste management, the Solid Waste Information

Retrieval System of EPA endeavors to collect, index, and store published information on current research and technological developments throughout the world. It publishes "Refuse Collection and Disposal Annotated Bibliography" and other relevant material. Symposium participants interested in radiation effects of various kinds will find that the centers that deal with the biological effects of radiation also include physical effects and other aspects of radiation in the environment. For example, the Bureau of Radiological Health of the Public Health Service collects literature and provides various services in the fields of x-ray physics, particle accelerators, radioactive substances, nuclear reactors, fall out, radiation standards, etc. Dr. Cottrell's own center on nuclear safety is another example of a center that provides a great deal of information on the physical behavior of some aspects of the environment.

Further, the broad-range documentation services to be discussed in detail later in this symposium serve the fields that I am dealing with as well as much of the rest of science and technology. Those persons who need to know what research projects are now current, what their basic approach is, and who is responsible, can consult the Smithsonian Science Information Exchange, Inc. All government agencies are expected to submit a one page description of new projects and an annual updating of continuing activities to this organization. As might be expected, the coverage varies with the agency.

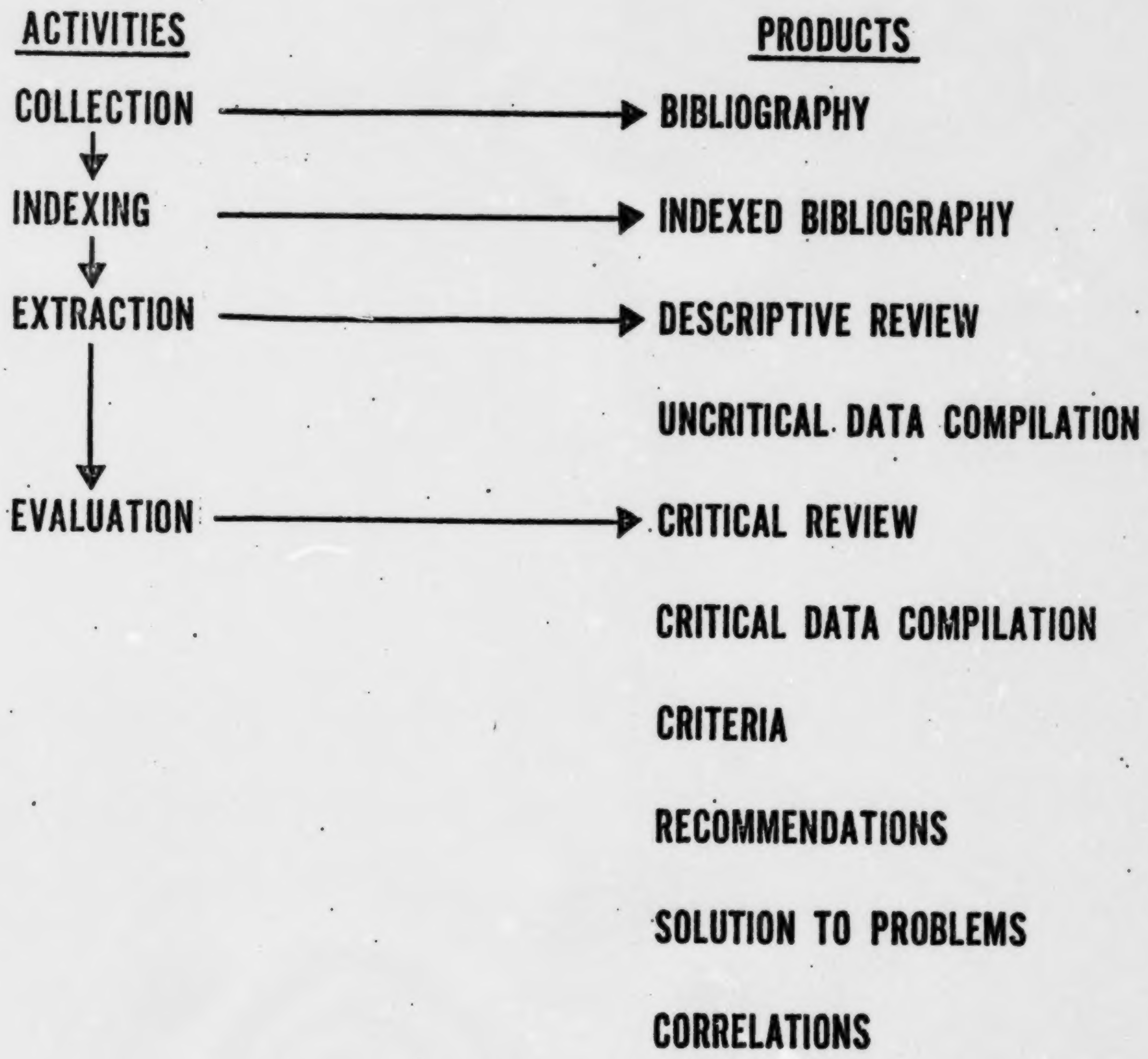
Unfortunately for those people interested in the physical sciences, the coverage in these areas is not nearly so good as in the biological sciences. SSIE prepares a number of research catalogs at the request of various other agencies. For example, it prepares the Water Resources Research Catalog previously mentioned.

Similarly, anyone who is interested in results that have already been obtained rather than what research is now under way, should become familiar with the services of the National Technical Information Service of the Department of Commerce. The Director of this organization, Mr. William T. Knox, will speak later in this symposium on the activities of NTIS. I will mention only that NTIS receives tens of thousands of technical reports per year, abstracts them, indexes them, and announces and sells them to all comers. It is the principal source of Federal government report literature for those persons not on primary distribution lists.

NTIS has tens of thousands of customers and distributes millions of documents per year, in both paper copy and microfiche. It is recognized by people all over the world as a treasure house of information.

This talk has been a sketchy survey of some of the information center activities now under way; the details of none of them have been presented to you. I have tried to give a general indication of types of activities and where you can go to learn more about them. The essential message I want to get across is that many resources are available to the scientists, the engineer, the regulation writer, and the citizen who needs, or just wants, information relating to the physical features of the environment and the things that civilized societies do to the environment. Learn how to use them!

INFORMATION ANALYSIS CENTERS



ACTIVITIES	PRODUCTS
COLLECTION	BIBLIOGRAPHY
INDEXING	INDEXED BIBLIOGRAPHY
EXTRACTION	DESCRIPTIVE REVIEW
	UNCRITICAL DATA COMPILATION
EVALUATION	CRITICAL REVIEW
	CRITICAL DATA COMPILATION
	CRITERIA
	RECOMMENDATIONS
	SOLUTION TO PROBLEMS
	CORRELATIONS

FIGURE 1

TABLE I

PUBLICATIONS OF NSRDS
SELECTED LIST

1. Band Spectrum of Carbon Monoxide

   NSRDS-NBS-5

2. Tables of Bimolecular Gas Reactions

   NSRDS-NBS-9

3. Thermodynamic Properties of Ammonia

   NSRDS-NBS-19

4. Gas Phase Reaction Kinetics of Neutral Oxygen Species

   NSRDS-NBS-40

5. Kinetic Data on Gas Phase Unimolecular Reactions

   NSRDS-NBS-21

6. Photon Cross Sections, Attenuation Coefficients, and Energy Absorption Coefficients from 10 keV to 100 GeV

   NSRDS-NBS-29

7. Critical Micelle Concentrations of Aqueous Surfactant Systems

   NSRDS-NBS-36

8. Selected Values of Heats of Combustion and Heats of Formation of Organic Compounds Containing the Elements C, H, N, O, P, and S

   E. S. Domalski, J. Phys. Chem. Ref. Data, 1, 221 (1972)

9. Properties of Molecules Important in Air Pollution Studies

   In Press

FEDERAL ENVIRONMENTAL
DATA CENTERS AND SYSTEMS

Arnold R. Hull
Associate Director for Climatology
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National Oceanic and Atmospheric Administration
U. S. Department of Commerce

I INTRODUCTION

Our environment extends from the center of the Earth to the center of the sun. There is hardly an area of human activity in which environmental data are not needed daily to improve man's understanding and use of his environment and its living and non-living resources.

Every minute of every day thousands of observations are made concerning the myriad aspects of our environment. Eventually, many of these data--whether collected in the ocean's depths, outer space, or a country field--wind up in one of the Federal Government's environmental data centers or systems, where they are generally available to all. The questions I shall answer during this presentation are: (1) Who has what data? (2) What specific products and services are available to users? (3) How do users plug into the system?

II FEDERAL DATA CENTERS AND SYSTEMS

I will limit detailed discussion to the centers and systems that collect and monitor large volumes of environmental data. Copies of a listing of user contacts, as well as addresses and phone numbers (Appendix 1) for these activities are available at the NOAA booth (no. 266) in the exhibit area.

The centers and systems I will discuss are, for the most part, described in outline form in the SEQUIP (Study of Environmental Quality Information Programs) Directory, part of the SEQUIP Report, prepared for the President's Office of Science and Technology. Bob Freeman of EDS will lead an informal forum session on SEQUIP at 8 p.m. this evening. All are welcome.

Department of the Interior

(1) National Water Resources Data System.

The Water Resources Division of the U. S. Geological Survey (USGS) conducts investigations and research on the occurrence, quality, quantity, distribution, utilization, movement, and availability of surface and underground waters. One of the Survey's most important activities in this regard is the systematic collection, analysis, and interpretation of data to evaluate the Nation's water resources. These data are computer processed for storage, retrieval, and dissemination.

Types of Data Available

USGS data collection and water-resources assessment are carried out in every State and in Puerto Rico, the Virgin Islands, and the Pacific Trust Territories. General-purpose water-quality information is acquired on a continuing basis at nearly 5,700 sites. Special-purpose water-quality data gathered by monitoring toxic metals, pesticides, and radiochemical constituents at selected locations are also available. In addition, the Survey acquires, processes, and publishes water-discharge and water-quality information for some 18,000 streamflow stations and 28,000 ground-water observation wells. Finally, more than 860 areal investigations, covering about three-quarters of a million square miles, are or were in progress during 1972.

Records for about 220,000 station years of streamflow data on some 35,000 wells and 4,000 water-quality stations are available. Streamflow and quality-of-water records have been placed on magnetic tape. Information concerning the availability of these data and the publications listed below may be obtained from USGS (see Appendix 1).

Publications

Streamflow, water quality, and ground water level data are published in annual data releases according to State boundaries. The principal USGS hydrologic data publications series are: (1) "Surface-Water Supply of the United States," (2) "Quality of Surface Waters of the United States," and (3) "Ground-Water Levels in the United States." In addition to these basic-data reports, other publication series describe the magnitudes and frequencies of floods, as well as noteworthy floods that have occurred in each year.

NAWDEX

To facilitate the movement of data between agencies and individuals working in the fields of water-resources evaluation, development and management, the Geological Survey will establish a National Water Data Exchange (NAWDEX) in FY 1973. General capabilities of NAWDEX will be: (1) To coordinate water-data files of member agencies. (2) To produce a verified, standardized, and consistent data base. (3) To incorporate units of measurements within both the English and metric systems. (4) To respond to requests in required time frames. (5) To be responsive to national requirements. (6) To serve as a model for emerging non-Federal, water-data handling systems and eventually as a linking mechanism between such systems.

USGS plans to have a limited NAWDEX operational capability by mid-1973 with full implementation scheduled for 1975.

(2) Earth Resources Observations System (EROS) Data Center. Photographic products acquired by NASA from surface, airborne, or space-borne platforms for research and experimental use in NASA's Earth Resources Survey Program are, except as may be prohibited by law or regulation, available for purchase by private and public parties, both foreign and domestic. These data products are sold to the public by the Department of the Interior's EROS Data Center as well as by NOAA's Environmental Data Service, and USDA's Agriculture Stabilization and Conservation Service.

The EROS Data Center in Sioux Falls, South Dakota, is operated by the Topographic Division of the Geological Survey. It disseminates NASA earth resources program data to users in such land-oriented fields as geography and geology, among others, as well as a variety of aerial photographs relating to Department of the Interior programs.

Data Products Available

NASA-processed Earth Resources Technology Satellite (ERTS) data products are either system-corrected images (bulk) provided to the Data Center in the form of 70-mm film, or scene-corrected images (precision) provided on 240-mm film, at a scale of 1:1,000,000. Only about 5 percent of the ERTS imagery available in the Data Center have been precision processed. Copies of the system-corrected individual images are available at contact scale (approximately 2 1/2 x 2 1/2 inches), or enlarged to approximately 9 x 9 inches.

NASA imagery obtained from aircraft and spacecraft (including the manned Apollo and Gemini missions) in support of its Earth Resources Survey Program are also available. Copies of these photographic products may be purchased at contact scales, as enlargements or reductions, in color or black and white, on film or on paper.

Computer-compatible magnetic tapes of both ERTS data and NASA Aircraft Program data are available for reproduction through the Data Center.

Aerial photographs taken by the U. S. Geological Survey primarily for topographic and geologic mapping purposes are also available from the EROS Data Center. The vase majority are black and white, vertical photographs at a scale of approximately 1:24,000 (contact prints are 9 x 9 inches); coverage is of discontinuous areas through the counterminous U. S., Alaska, Hawaii, and the

Territories. The remainder are either low oblique or high-altitude photographs, black and white, in a 9 x 9 inch format.

Photographs made in support of various projects of the Bureaus of Reclamation and Land Management are also available at various scales reflecting the specifications of the particular project. A computerized index of USGS-held photographs is available at the Data Center. Photographs made prior to 1941 are held by the National Archives and Record Service. All aerial photographs are available at contact scales, as enlargements or reductions, on film or on paper.

Catalogs and Browse Films

Data catalogs and 16-mm "browse films" for all NASA-generated imagery are available at the center for rapid user-evaluation of the data collection. A browse film is also provided for the Center's aerial photography products.

The 16-mm browse films are available for user purchase. Films for ERTS data are updated every 18 days and can be ordered on a subscription basis. Updating of the other browse films is irregular and films must be purchased individually.

User Training

Periodically the staff of the EROS Data Center will offer discipline-oriented remote sensing courses in agriculture, forestry, geography, geology, hydrology, and oceanography, emphasizing the use of ERTS data.

There will be a basic remote sensing course covering simple interpretation tools and techniques and an advanced course which will provide an opportunity to study various remote sensing research techniques.

User Services

The EROS Data Center staff will assist users in locating imagery and photography to meet individual needs. Inquiries may be made by telephone, letter, or personal visit. If you need assistance, the staff will help you identify data best suited to your needs, but you should be prepared to tell them: (1) limits of the geographic area of interest, (2) what you want the data for, and (3) how you want to use the data.

Normal processing of orders takes one week. Orders for (1) enlargements of ERTS data other than 1:1,000,000-scale and (2) USGS photography obtained prior to 1941 will require longer processing time.

All orders must be accompanied by prepayment; a current price list is available on request. Extra charges for shipment by Air Express or Airmail, and Special Delivery are paid by the purchaser. In addition to the cost of reproduction, the user will be assessed the cost of any required interim step product; interim products will be accessioned by the Data Center and be made available to all users thereafter at cost of reproduction.

NOAA and USDA
Earth Resources Data Dissemination

NOAA provides earth resources data to its user publics through the

Environmental Data Service's National Climatic Center (NCC), in Asheville, North Carolina, while USDA's user interface is the Western Aerial Photography Laboratory in Salt Lake City. NOAA services users primarily interested in data related to oceanography, hydrology, and meteorology. The Department of Agriculture serves those seeking satellite imagery for agricultural applications.

Requests for photographic copies of bulk-processed imagery will be filled as ordered from 70-mm negatives already in the agencies' files. Requests for either precision-processed photographic copy or digital data in tape format will require special order from NASA, and will entail a delay in preparation.

Nationwide "Browse-Film" Services

Browse films (16-mm) of earth resources imagery are available at many sites throughout the country (and in the Canal Zone) for use by local users. Generally, the sites are (or will be) open daily from 9:00 a.m. to 3:00 or 3:30 p.m. (Department of the Interior), except on weekends and legal holidays. Order forms, procedures, and prices of available data will be posted in each location.

Copies of a listing of the browse-file locations (Appendix 2) are available at NOAA's exhibit booth; this listing also includes the addresses of the USDA and NOAA outlets for earth resources data products.

Environmental Protection Agency

(1) National Water Quality Control Information System (STORET). STORET is the central, computer-oriented repository for all water quality control data collected by EPA and cooperating agencies. STORET provides data needed for decision making in water pollution control activities whether at the Federal, State, basin, or local level.

Data Resources

STORET houses and retrieves data and information on water; water quality standards; pollution-caused fish kills; manpower and training; municipal and industrial waste discharge; and waste abatement needs, costs, and implementation schedules. Given this data, the user can define the cause-and-effect relationship of water pollution; measure compliance with State and federal water quality standards; check the status of waste treatment plant needs, grants, and implementations; and determine pollution trends.

STORET currently contains 10 individual data files relating primarily to identification of wastewater discharges and ambient water quality. The STORET computer system, provided by private contractor, is located in McLean, Virginia. The total current storage volume of the system is approximately two billion alpha-numeric data characters.

Data can be entered into and retrieved from STORET in a large variety of formats. Outputs include statistical summaries and other forms of analyses. Data entered into STORET are immediately retrievable, can easily be corrected and updated, and are normally available to all STORET users. When necessary, however, the availability of data can be restricted to a single user. Thus, an agency or individual may store, retrieve, and analyze sensitive data with no fear of unauthorized retrieval or modification.

Data are stored on high-speed, random-access devices, making it possible to respond to over 1,000 information requests daily. Responses are relayed to the user via high-speed telecommunications lines, and printed at a computer terminal, providing hard-copy answers to queries within minutes. STORET also provides micro-output in film, fiche, or aperature card format. To assist users the Technical Data and Information Branch provides 12 full-time personnel to provide STORET user assistance.

STORET Users

EPA encourages the use of STORET by other Federal, State, and local agencies with missions relating to environmental protection, water pollution control, or water research. As of July 10, 1972, there were 140 low-speed STORET terminals in State and other Federal agencies' offices. To aid non-EPA users, a computer terminal is loaned for 30 days and necessary operator training is provided by EPA. After 30 days, EPA continues to pay computer costs, while the user pays terminal lease charges. STORET data are also available to the public, usually in published form.

Future Services

Improvements being added to STORET include a River Mile Index (RMI) location system to allow "hydrologic order" location of points of interest and a General Point Source File (GPSF), which will accept descriptions of all point sources of pollution. When RMI's become available for all STORET data, a user will be able to retrieve effluent and ambient water quality data in stream-flow order and estimate cause and effect information simply by reading the data in that order. The present project covers 30 States where no RMI data currently exist.

About 70 percent of the GPSF computer programming work is completed. GPSF will allow point sources of pollution to be related to ambient water quality data.

(2) National Air Data Branch (NADB)

EPA's National Air Data Branch is charged with the collection, validation, analysis, and publication of (a) air quality data in the SAROAD (Storage and Retrieval of Aerometric Data) system, and (b) emissions data in the NEDS (National Emission Data System) system. The National Air Data Branch is located in Durham, N. C. and accesses the EPA Research Triangle Park, N. C., computer.

Data Archived

SAROAD collects and validates ambient air quality measurement data. In general, data concern the five primary pollutants: suspended particulates, hydrocarbons, sulfur dioxide, nitrogen oxides, and carbon monoxide and oxidant. In addition, many trace elements and compounds have been assigned codes. The monitoring time periods have also been codified, as has sufficient information to characterize the sampling site.

Currently, about 1,000 monitoring stations are submitting data. In addition, old data collected by State, local, and Federal agencies have been incorporated into the National Ambient Data Bank (NADB), so that there are considerably more monitoring sites defined as a result of previous (and perhaps not currently operational) monitoring activities.

NEDS is concerned with emissions, source inventory, and emission factor data collection and validation. Approximately 80 data items stored about each point source of air pollutant emissions are contained in the National Emissions Data Bank (NEDB). About the same number of items are kept for each area source of emissions--defined in NEDB as a county (or equivalent). There are about 75,000 point sources which emit more than 100 tons/year of any one of the primary air pollutants, and about 3,300 area (county) sources in the 55 states and territories.

Data in NEDB are primarily those which permit calculation of emissions, although emission estimates for the individual sources are also stored. In addition, stack parameters and other information pertaining to the operational characteristics of the source are available.

Data System

The normal flow of data from State and local agencies to both SAROAD and NEDS is through the EPA regional offices. Data collected through EPA programs are submitted directly to the National Air Data Branch. In general, no data for either system can be entered immediately, but must be stored temporarily for Branch validation, thus assuring quality control of all information input. Both SAROAD and NEDS use the same parameter codes and geographical codes for States, counties, air quality control regions, and cities. Analysis by geographical area can be made for any one or combination of these areas.

Data Services

SAROAD and NEDS are designed to serve EPA, State and local agencies, and the general public. Both are still in the developmental stage, with limited EPA operational status scheduled for early 1973. As soon as practicable, EPA hopes to provide State and local agencies with terminal access to NADB/NEDB. National Air Data Branch personnel and contractors will help them modify their current systems to achieve compatibility with NEDS and SAROAD systems. Public requests for data from either system should be addressed to the appropriate

EPA regional office.

Reports and Publications

Various data reports are available to users, including raw data listings for each site and point/area source. Monthly, quarterly, and annual air quality statistics are also available. In addition, both air quality and calculated emissions data are provided, together with gridded and apportioned area emissions and fuels for strategy modeling. These and other special reports and publications are available through EPA's regional offices.

Expansion

The SAROAD system is expandable with respect to sites, pollutants, methods, and measurement units; the extent of data analysis may also be increased. The potential capacity of NEDS for the storage of State, county, or source-oriented data is almost limitless.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

(1) National Space Science Data Center

The National Space Science Data Center (NSSDC) was established to widen the use of reduced satellite data and to provide an active respository for such data. NSSDC is responsible for the collection, retrieval, dissemination, and exchange of data received from satellite experiments, sounding-rocket probes, and high-altitude aeronautical and balloon investigations. In addition, the Data Center collects correlative data, such as magnetograms and ionograms, from ground-based observations and stations for NASA investigators and for onsite use at NSSDC in the analysis and evaluation of space science experimental results.

Data Archived

Primarily, NSSDC acquires reduced records prepared from original data by the introduction of scaling and correction factors. An attempt is made to assure later investigators independent use of the data by providing such additional information as instrument description and calibration, data reductions method, bibliographic notes, etc. In addition, the data center collects those final analyzed data which the principal investigator identifies as the most useful and best illustrating the scientific results of his experiment.

In general, data are in machine-sensible form but can also include charts, graphs, photographs, and tables. The preferred medium in each case usually is determined by consultation between the principal investigator and the Data Center staff.

Data Dissemination and Exchange

The Data Center provides duplicate copies of reduced experimental data on request. Within the capabilities of NSSDC, the data may be converted to another medium to meet the needs of the requester. The Center also provides for the exchange of space science data; based on the mutual agreement of the principal investigators of a project, the project scientist of satellite/rocket experiments arranges for the exchange of the data through NSSDC facilities during the prime analysis period. NSSDC publishes several series of data announcements describing their data inventory, correlative data, and supplementary information.

User Services

Research work may be performed onsite at NSSDC by both resident and visiting scientists. User support services include technical assistance and the use of equipment. Limited staff assistance and use of facilities are provided free; nominal fees are charged for special reproduction, computer/programming time, and dissemination costs.

All requests for data, publications, and information about NSSDC's facilities should be directed to the Data Center (see Appendix 1). Proposals by U. S. investigators to perform on- or offsite investigations using the data available at NSSDC may be submitted to NASA for funding considerations. Information concerning the submission of proposals can be found in "Opportunities for Participation in Space Flight Investigations," NASA NHB 8030.1A, April 1967.

U. S. Department of Commerce

National Oceanic and Atmospheric Administration (NOAA). NOAA's Environmental Data Service (EDS) operates 3 environmental data centers: the National Climatic Center (NCC), the National Oceanographic Data Center (NODC), and the National Geophysical and Solar-Terrestrial Data Center (NGSDC). EDS is also developing a Great Lakes data center, temporarily located within the NODC. (Another component--the Environmental Science Information Center--provides a literature-related system complementary to EDS' data system). All centers serve the general public, other Federal agencies, business and industry, the academic community, State and local governments, and foreign users.

(1) THE NATIONAL CLIMATIC CENTER (NCC) in Asheville, N. C. is the largest climatological data center in the world, a unique central source of historical weather data and related data products. As the collection center and custodian of all United States weather records, NCC obtains data generated by NOAA's National Weather Service, the weather services of the Air Force, Navy, and Coast Guard, the Federal Aviation Administration, and thousands of cooperative observers.

NCC Data Services and Products

Climatological data available from NCC include: hourly surface meteorological observations from land stations; 3-hourly and 6-hourly surface observations from land stations, ocean weather stations, and moving ships; upper air observations; radar observations; meteorological satellite data; selected maps and charts originally prepared by NOAA's National Meteorological Center; derived and summary data and tabulations; special collections such as Barbados Oceanographic-Meteorological Experiment meteorological data, Global Atmospheric Research Program basic data set, solar radiation data, and many others.

After computer and human editing, data for which there is general user demand are summarized and disseminated in a wide variety of publications. Each year, one million copies of monthly and annual NCC climatological publications are mailed to 65,000 subscribers.

Other data forms and products available to users include special summaries, copies of original records or groups of records, magnetic tapes, computer output to microfilm analyses or graphics, and hand-prepared tabulations and analyses.

(2) THE NATIONAL OCEANOGRAPHIC DATA CENTER (NODC) houses the world's largest accessible collection of marine data. It is the national repository for historical oceanographic data and data products.

NODC receives data for all oceans, seas, and estuaries from hundreds of sources, domestic and foreign, including the national data centers of other countries. Data and publications are also obtained by exchange between the Center and individuals and organizations in 45 countries and such groups as the ICES, the International Council for the Exploration of the Sea, as gifts from scientists and organizations wishing to share their data, and through the purchase of valuable marine data collections.

NODC Data Services and Products

Oceanographic data available from NODC include: mechanical and expendable bathy-thermograph data in analog and digital form; oceanographic station data for surface and serial depths; continuously recorded salinity-temperature-depth data in digital form; surface current information; biological data; geological sampling inventory, primarily for the New England Continental Shelf; and bottom sample information.

NODC services and products include: data processing; data reproduction--in computer printout, punchcard, magnetic tape, and other forms; analysis and preparation of statistical summaries; evaluation of various data records for specific analytical requirements; library search; referral; provision of general marine sciences information; and publications, including data processing manuals, catalogs of holdings, data reports, and atlases. The "User's Guide for NODC's Data Processing Systems," available from NODC on request, provides detailed information concerning data holdings.

Great Lakes Data Services

In February 1972, EDS established within NODC a special unit to meet the needs of multidiscipline data users in the Great Lakes drainage area. The unit has prepared a project inventory for the International Field Year for the Great Lakes (IFYGL). The inventory contains about 3,000 computerized records of the data collected this year from Lake Ontario. Although designed primarily for use by United States and

Canadian managers for IFYGL, the listing is available to any user interested in environmental data for the Great Lakes area.

(3) NATIONAL GEOPHYSICAL AND SOLAR-TERRESTRIAL DATA CENTER (NGSDC) is responsible for environmental data in the fields of seismology, geomagnetism, marine geology and geophysics, solar activity, interplanetary phenomena, the ionosphere, cosmic rays, aurorae, and airglow.

NGSDC Data Archives

SEISMOLOGY. Some 300,000 seismic recordings or seismograms per year from about 150 earthquake-monitoring stations around the globe are processed and archived by the NGSDC's Solid Earth Sciences Division, adding to a file that numbers more than two million seismograms. Accelerograms and data analyses from NOAA's strong-motion seismology program are also part of the Center's seismic holdings.

GEOMAGNETISM. Geomagnetic data are received from United States and foreign sources and consist primarily of worldwide geomagnetic survey measurements and observatory magnetograms, which show changes in direction and strength of the earth's magnetic field, hourly values, and indices of magnetic activity. Holdings include some one million magnetograms, which accumulate at a rate of about 50,000 per year (most are stored on 35-millimeter microfilm). The Solid Earth Data Services Division also compiles United States and World Magnetic Charts, the latter in collaboration with the U. S. Naval Oceanographic Office.

MARINE GEOLOGY AND GEOPHYSICS. NGSDC handles gravimetric, magnetic, bathymetric, and seismic observations collected at sea by Federal agencies and many universities and research centers, as well as some foreign sources. In addition, NOAA's Environmental Data Service is managing and disseminating marine geophysical data obtained from explorations under the International Decade of Ocean Exploration (IDOE).

SOLAR-TERRESTRIAL PHYSICS. Most of the data managed by the center's Solar-Terrestrial Data Service Division come from worldwide sources under international exchange agreements. The rapidly expanding file contains more than 11 million feet of ionogram film, 800,000 feet of all-sky camera film, 2.5 million sheets of graphical and numerical data, and additional information on magnetic tape from NOAA and NOAA-supplied stations and several hundred cooperating institutions.

Ionosphere data received include vertical soundings, topside soundings, electron density profiles, systematic observations of ionospheric absorption and drifts, atmospheric radio noise measurements, whistlers, very-low-frequency noise observations, and other categories. Solar activity data include those on solar flares, radio emission events, sudden ionospheric disturbances, and some satellite monitoring measurements of ultraviolet, X-ray, and particle emissions, and the solar wind. Also included are global solar patrol data on calcium plages, solar magnetic fields, and chromospheric structure, various daily maps of the sun, and solar indices. Auroral data consist mainly of all-sky photographs. Cosmic ray observations are made by the world network of ground-based stations.

NGSDC data are available in numerous reports and publications; in microfilms; on punched cards or magnetic tape; in summaries and tables; and, maps, charts, and graphs. Marine geological records include cores, samples, and best flow and sediment data.

Environmental Data Service
User Requests

EDS data and data products are available to users upon request on an exchange basis, at the cost of retrieval and reproduction, or--for publications and certain simple services--at unit costs established by the Department of Commerce. Addresses and telephone numbers are given in the listing of user contacts (Appendix 1) I mentioned at the beginning of my presentation, available at the NOAA booth. User requests to any of EDS data centers should define the data required, stations, or geographical areas of concern, desired format, and a description of the problem for which the data are required.

User-visitors are welcome at the NCC, NODC, and NGSDC. Working space and technical assistance are available upon request; advance notice is requested, however, for scheduling purposes.

II OTHER CENTERS AND SYSTEMS

In addition to the large-volume centers and systems I have just described, there are other environmental data activities which should be noted. In general, their holdings consist of biological, chemical, geological, or tides and currents data. Brief summaries (see Appendix 3) of specific centers and systems are contained in the SEQUIP Directory, which should soon be available to the public, either through the Government Printing Office or the Department of Commerce's National Technical Information Service.

III WORLD DATA CENTER A:
Mechanism for International Exchange

You have already heard Dr. Townsend outline the World Data Center A (WDC-A) system, established in the United States as a result of the International Geophysical Year (IGY). Under an agreement with the National Academy of Sciences, NOAA is responsible for WDC-A activities in solar and interplanetary phenomena; ionospheric phenomena; aurora, cosmic rays, and airglow; geomagnetism; gravity; seismology; the **Upper Mantle Project Archives; tsunami; oceanography; and meteorology and nuclear** radiation. Glaciology is the responsibility of the U. S. Geological Survey; longitude and latitude of the U. S. Navy, and rockets and satellites of NASA's National Space Science Data Center.

Most of the WDC-A subcenters are identical with or collocated at national centers for the same disciplines. Each regularly exchanges data with WDC-B (Moscow) and WDC-C (countries in Western Europe). In addition, they also receive data from cooperative international programs and, in some cases, from national programs.

The WDC-A system is a nongovernmental program. It was organized under the International Council of Scientific Unions (ICSU), whose constituent bodies are the academies of science of the countries involved--not government agencies. The centers are freely accessible to visiting scientists of any country and, on request, provide copies of their data at cost.

The overall guidance of the World Data Centers is the responsibility of the ICSU panel composed of representatives from each of the major geophysical areas and from the WDC's themselves. The role of the ICSU Panel is to coordinate policies common to all disciplines and to give final approval to guides prepared for the various disciplines by appropriate scientific bodies. The Panel intends to issue in 1972 a consolidated guide that will incorporate guidelines for all scientific areas of concern.

IV REFERRAL SERVICES

(1) ENDEX

Dr. Townsend cited the Stockholm conference's recognition of the need for international referral services, as well as the national and local needs. As an example, we might consider the many cooperative coastal zone studies now being contemplated; the various Federal, State, local, and private organizations involved cannot intelligently plan their projects without pertinent available data and information; and they certainly do not want to duplicate existing data files through their own collection efforts.

To meet such national needs, NOAA's Environmental Data Service (EDS) is developing "ENDEX," an Environmental Data Index. When ENDEX is fully developed, a user will be able to obtain rapid referral to national and international data archives and sources simply by calling an information specialist at any EDS center to "plug into" the interdisciplinary ENDEX system.

EDS is currently documenting collections scattered nationally and internationally, obtaining available inventory and reference materials, and integrating these into the ENDEX system. We are beginning with collections easily accessible and particularly pertinent to contemporary environmental problems.

V A LOOK AHEAD

As you can see, there are many disciplines, collectors, processors, and users in the environmental data field. Essentially, the data centers and systems I have discussed exist to serve the user community. To minimize duplication of efforts and get the most out of our data dollar, we must communicate, cooperate, and coordinate our efforts. This is the prime reason for this Symposium.

Overall, the present trend toward increasing interdisciplinary, interagency--and international--cooperation and coordination can only accelerate. The "environment" is not divisible; you cannot isolate any one area, whether by discipline, geography, or organization, and deal with it realistically. The word "interface" has long since become a cliche with respect to environmental data.

Finally, I would like to repeat Dr. Townsend's invitation for each of you to participate as fully as possible in the Symposium.

In our varying roles, each of us is working toward the same goal: an environmental data system capable of efficiently and economically meeting the growing challenges of our environment.

Appendix 1

USER CONTACTS

National Water Resources Data System

WRITE: Chief Hydrologist
Water Resources Division
U.S. Geological Survey
Washington, D.C. 20242

CALL: 202-343-9425 (Commerical & FTS*)

Earth Resources Observation System (EROS) Data Center

WRITE: EROS Data Center
Data Management Branch
10th & Dakota Avenue
Sioux Falls, South Dakota 57198

CALL: 605-339-2270 (Commercial)
605-336-2381 (FTS*)
(7:00 A.M. - 7:00 P.M. Central Time)

Address all correspondence concerning ERTS data user training courses to Mr. Donald Kulow, Training Officer.

National Water Quality Control Information System (STORET)

WRITE: C. S. Conger
Chief, Information Access
and User Assistance Branch
Room 928, C.M. 2
Environmental Protection Agency
Washington, D.C. 20460

CALL: 703-557-7617 (Commercial)

National Air Data Branch (SAROAD & NEDS)

WRITE: J. R. Hammerle, Chief
National Air Data Branch
Monitoring and Data Evaluation
Division
Office of Air Quality Planning
and Standards
Environmental Protection Agency
Research Triangle Park, N.C. 27709

CALL: 919-688-8110 (Commercial)

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*Federal Telecommunications System

Appendix 1 (cont.)

National Space Science Data Center (NSSDC)

WRITE:
National Space Science Data Center
Goddard Space Flight Center
Code 601
Greenbelt, Maryland 20771

CALL: 301-982-6659 (Commercial)

National Climatic Center (NCC)

WRITE:
The National Climatic Center
National Oceanic and Atmospheric Administration
Federal Building
Asheville, North Carolina 28801

CALL:
704-254-0961 Ext. 683 (Commercial)
704-254-0683 (FTS*)

Residents of the Washington, D.C. area may call NCC directly and toll-free by dialing (no area code required) 495-2424.

National Oceanographic Data Center (NODC)

WRITE:
The National Oceanographic Data Center
National Oceanic and Atmospheric Administration
Rockville, Maryland 20852

CALL: 202-426-9044 (Commercial)

VISIT: NODC is located in the Washington Navy Yard at 2nd and M Streets, Southeast, Building 160, Washington, D.C.

National Geophysical and Solar-Terrestrial Data Center (NGSDC)

Most of the NGSDC activities are located at 30th and Marine Streets, Boulder, Colo. The marine geology and geophysics group, however, is located at 2001 Wisconsin Avenue, N.W., Washington, D.C.

WRITE:
Director
Environmental Data Service D6
NOAA
Boulder, Colo. 80302

CALL: 303-499-1000 Ext. 6215 (Commercial & FTS*)

Environmental Data Service DF62
NOAA
Washington, D.C. 20007

202-343-7368 (Commercial & FTS*)

Appendix 2

EARTH RESOURCES SURVEY PROGRAM
BROWSE FILE LOCATIONS

U.S. Department of Agriculture

Utah

Western Aerial Photography Laboratory
2505 Parley's Way
Salt Lake City, Utah 84109

U.S. Department of Commerce

Alaska

National Weather Service Alaskan Region
632 6th Avenue
Anchorage, Alaska 99501

California

Director, Southwest Fisheries Center
8604 La Jolla Shores
La Jolla, California 92037

Marine Minerals Technology Center
3150 Paradise Drive
Tiburon, California 94920

Colorado

Aeronomy and Space Data Center
Radio Building No. 3
Boulder, Colorado 80302

Florida

Atlantic Oceanographic and Meteorological Laboratories
15 Rickenbacker Causeway
Virginia Key
Miami, Florida 33149

Hawaii

National Weather Service Pacific Region
Bethel-Paushi Building
1149 Bethel Street
Honolulu, Hawaii 96813

Maryland

National Environmental Satellite Service (ESG)
Suite 300
3737 Branch Avenue
Hillcrest Heights, Md. 20031

National Ocean Survey C3413
6001 Executive Blvd.
Rockville, Md. 20852

National Oceanographic Data Center
6001 Executive Boulevard
Rockville, Maryland 20852

Appendix 2 (cont.)

Atmospheric Sciences Library D821
8060 13th Street (Room 802)
Silver Spring, Maryland 20910

Massachusetts
Director, Northeast Fisheries Center
P. O. Box 6
Woods Hole, Massachusetts 02543

Michigan
Lake Survey Center CLx13
630 Federal Bldg. & U.S. Courthouse
Detroit, Michigan 48226

Missouri
National Weather Service Central Region
601 E. 12th Street, Room 1836
Kansas City, Missouri 64106

New York
National Weather Service Eastern Region
585 Stewart Avenue
Garden City, New York 11530

North Carolina
National Climatic Center
Federal Building
Asheville, North Carolina 28801

Oklahoma
National Severe Storms Laboratory
1616 Halley Avenue
Norman, Oklahoma 73069

Texas
Office of Sea Grant
Center for Marine Resources
Texas A&M University
College Station, Texas 77843

National Weather Service Southern Region
819 Taylor Street, Room 10E09
Fort Worth, Texas 76102

Utah
National Weather Service Western Region
Box 11188, 125 So. State Street
Salt Lake City, Utah 84111

Virginia
Atlantic Marine Center
439 W. York Street
Norfolk, Virginia 23510

Washington
Northwest Marine Fisheries Center
2725 Montlake Blvd. East
Seattle, Washington 28112

Wisconsin
Office of Sea Grant
University of Wisconsin
1225 W. Dayton Street
Madison, Wisconsin 53706

Department of the Interior

Alaska

Miss Margaret I. Erwin
Public Inquiries Office
U.S. Geological Survey
108 Skyline Building
508 2nd Avenue
Anchorage, Alaska 99501
Phone - 907-277-0577

Arizona

U.S. Geological Survey Library
601 East Cedar Avenue
Flagstaff, Arizona 86001
Phone - 602-774-1330

Mr. Herbert H. Schumann
Water Resources Division
U.S. Geological Survey
Room 5107 Federal Building
230 North 1st Avenue
Phoenix, Arizona 85025
Phone - 602-261-3188

California

Miss Lucy E. Birdsall
Public Inquiries Office
U.S. Geological Survey
Room 7638, Federal Building
300 N. Los Angeles Street
Los Angeles, California 90012 Phone - 213-688-2850

Regional Topographic Engineer
U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025
Phone - 415-323-8111

Canal Zone

HQ Inter American Geodetic Survey
Drawer 934
Fort Clayton, Canal Zone
Phone - 117-1201 Panama Routine 833-227

Colorado

Regional Topographic Engineer
U.S. Geological Survey
Room 2404 Building 25
Denver Federal Center
Denver, Colorado 80225
Phone - 303-234-2351

Florida

Jon S. Beasley
State Topographic Engineer
Florida Department of Transportation
State Topographic Office
Talahassee, Florida 32304
Phone - 904-599-6212

Massachusetts

Mr. Lincoln Page
U.S. Geological Survey
5th Floor, 80 Broad Street
Boston, Massachusetts 02110
Phone - 617-223-7202

Mississippi

Mr. Gary North
EROS Program Assistance Office
Room B-210 Building 1100
USGS/Mississippi Test Facility
Bay St. Louis, Mississippi 39520
Phone - 601-688-3541

Missouri

A. C. McCutchen
USGS/Topographic Division
961 Pine Street
Rolla, Missouri 65401
Phone - 314-364-3680

New York

Dr. Janice Whipple
Water Resources Division
U.S. Geological Survey
Room 343 Post Office and
Court House Building
P.O. Box 948
Albany, New York 12201
Phone - 518-472-3107

Oregon

U.S. Bureau of Land Management
Director, Portland Service Center
P.O. Box 3681
Portland, Oregon 97208
Phone - 503-234-4001

South Dakota

EROS Data Center
U.S. Geological Survey
10th and Dakota Avenue
Sioux Falls, South Dakota 57198
Phone - 605-339-2270

Tennessee

William S. Massa
Chief, Maps and Surveys Branch
Tennessee Valley Authority
200 Haney Building
311 Broad Street
Chattanooga, Tennessee 37401
Phone - 615-755-2133

Washington

Mrs. Eva M. Raymond
Public Inquiries Office
U.S. Geological Survey
Room 678 U.S. Court House Building
West 920 Riverside Avenue
Spokane, Washington 99201
Phone - 509-456-2524

Washington, D.C.	Susan Moorlag CARETS Information Center 1717 H Street, N.W. Room 837 Washington, D.C. 20242 Phone - 202-343-5985
	EROS Program Library U.S. Geological Survey Washington, D.C. 20242 Phone - 202-343-7500
	Map Information Office U.S. Geological Survey Room B-310 GSA Building 18th and F Streets, N.W. Washington, D.C. 20242 Phone - 202-343-2611

Appendix 3

SEQUIP Summaries of Other
Environmental Data Center and Systems

NAME: Chemical Kinetics Information Center
National Bureau of Standards
Washington, D. C. 20234

TEL: (202) 921-2771

DIRECTOR: Dr. David Garvin

SPONSOR: Physical Chemistry Division,
Institute for Materials Research
National Bureau of Standards
Department of Commerce

MISSION: To collect, store, retrieve, evaluate and distribute data on the rates of chemical reactions. The long-term mission is to (a) serve as a supplier of specific kinetic data; (b) provide bibliographic material to authors of critical reviews for the National Standard Reference Data System; and (c) centralize and coordinate the analysis of kinetic data with the National Bureau of Standards. The scope includes rates of homogeneous chemical reactions in gaseous liquid and solid phases; photochemistry; inelastic scattering.

NAME: Chemical Thermodynamic Data Center
National Bureau of Standards
Washington, D. C. 20234

TEL: (202) 921-2773

DIRECTOR: Donald D. Wagman

SPONSOR: Physical Chemistry Division
Institute for Materials Research
National Bureau of Standards
Department of Commerce

MISSION: To collect, evaluate, and select best values of the chemical thermodynamic properties of pure substances and their aqueous solutions; and to provide and maintain self-consistent tables of "best" values of enthalpy and Gibbs free energy of formation, the entropy, heat capacity, and phase-change properties for chemical compounds. The scope includes thermochemical and thermophysical properties of pure chemical substances in gas, liquid, and solid phases and their aqueous solutions.

NAME: Ecological Information and Analysis Center (EIAC)
Battelle Memorial Institute
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

TEL: (614) 299-3151

DIRECTOR: Ann W. Rudolph

SPONSOR: Battelle Memorial Institute
Columbus Laboratories
Atomic Energy Commission

MISSION: To collect, store, retrieve, and evaluate information and data relevant to bioenvironmental and ecological studies. Subject scope of the EIAC currently includes mathematical modeling of ecosystems, population dynamics, bioenergetics, systems ecology, food-chain studies, and environmental aspects of air, water, and solid wastes pollution.

NAME:	Environmental Technical Applications Center U. S. Air Force Building 159 Navy Yard Annex Washington, D. C. 20333
TEL:	(202) 433-3901
DIRECTOR:	Col. Richard A. Johnston
SPONSOR:	Headquarters, 6th Weather Wing Headquarters Air Weather Service Military Airlift Command Department of the Air Force
MISSION:	To provide a centralized capability to collect, store, retrieve, process and analyze environmental data for publication, planning, and technical applications required by the Department of Defense, Army, Air Force, and authorized contractors.

NAME: Flora North America Program
Department of Botany
Smithsonian Institution
Washington, D. C. 20560

TEL: (202) 381-5801

DIRECTOR: Stanwyn G. Shetler

SPONSOR: Smithsonian Institution
National Science Foundation

MISSION: A comprehensive program of biological research, information systems development, and data banking concerned with the vascular plants of North America.

NAME: Geologic Division
U. S. Geological Survey
Washington, D. C. 20242

TEL: (202) 343-2125

DIRECTOR: Richard P. Sheldon

SPONSOR: U. S. Geological Survey
Department of the Interior

MISSION: To make geologic examinations to determine and appraise the mineral and mineral fuel resources and the geologic structure of the United States and its territories. A by-product of these examinations is the identification of geologic factors that bear on the use of the land and maintenance of environmental quality. These identifications include such processes as the compositional variations in major and all trace elements (including hazardous elements) of rocks, soils, and plants to provide baseline information on the natural occurrence of the elements, and the geochemistry of the sediments as they move through the coastal waters and onto the shelf.

NAME: National Ocean Survey
Oceanographic Division
Office of Marine Surveys and Maps
6001 Executive Boulevard
Rockville, Maryland 20852

TEL: (301) 496-8274

DIRECTOR: Cdr. R. L. Swanson

SPONSOR: National Oceanic and Atmospheric Administration

MISSION: To observe tides and tidal currents, to translate or digitize, reduce, analyze, compile, store and retrieve the data and to predict tides and tidal currents.

NAME: Office of Fuel and Fuel Additive Registration
Environmental Protection Agency
Research Triangle Park, North Carolina 27711

TEL: (919) 688-8146

DIRECTOR: Henry C. Miller, Jr.

SPONSOR: National Environmental Research Center
Environmental Protection Agency

MISSION: Registration of fuel additives in fuels designated by the Administrator, Environmental Protection Agency.

D. H. Michael Bowen
American Chemical Society

My task today is to try to describe to you the range of primary publications that carry scientific and technical information in the environmental field, and to give you some idea of the type of information, level of understanding needed, cost and availability of these publications.

This task has been considerably eased by the valiant efforts of the organizers of this symposium, who have tried their very best to ensure that there is not too much overlap between what I will say and what will be presented by other speakers at the symposium. The task, however, is still a difficult one, for several reasons: First, "environmental" information covers a multitude of sins; much scientific information is not of direct and obvious environmental significance, but may be indirectly (or at a date much later than initial publication) of very great significance. Second: there are many publications that carry information that is environmental, and technical in nature, but which are nevertheless not normally considered as environmentally related publications.

When you consider these two reasons, you will immediately appreciate how important is the role of secondary and abstracting publications, and of information services, and how vital it is that these publications and services have as extensive a data base as possible. Bernard Rosenthal, who will speak to you later, will describe these secondary publications. I shall confine myself to primary scientific and technical publications.

Now, what do I mean by "primary?" For the sake of simplicity, and at the risk of oversimplification, I mean a publication that publishes information written by the generator of the information, or written by him and rewritten by someone else. By this definition, newspapers, for example, are not primary publications nor, for obvious reasons, are secondary publications which abstract or extract pieces from something that has already been published. By this definition, too, parts of my own publication - ES&T -

do not qualify as "primary," since these parts contain accounts of technical work written by people other than the originators. There are many technical and scientific publications, though, that contain both primary and secondary material, and I shall consider these for the purpose of this talk as being primary.

At the outset, I must confess that it is impossible to be completely comprehensive in an area of such variety and magnitude as environmentally related scientific and technical publications. So, if I omit reference to some publications in my talk, or in the supplementary material that is distributed - and I am sure to do so - I beg your indulgence and take all responsibility. I have tried to be as unbiased as possible in selecting publications to mention; I have selected those best known to me that I believe will best illustrate the types of publications that are available.

There are many ways to categorize publications in the environmental field. One very simple way is to look at them as very old ones and very new ones. The old ones are exemplified by those in the field of public health, which have been publishing for 20 years or more. New ones are arriving on the scene almost daily, in response to two factors: (1) the tremendous explosion in public awareness of environmental problems; and (2) the just-beginning explosion in scientific and technical studies of environmentally related problems and the consequent need on the part of scientists for a publications outlet.

The number of new publications in this field is truly astounding. At a conservative guess, 30 or so have started up in the last five years. And although many of these could be, perhaps unfairly, categorized as "bandwagon" publications, many do serve a useful purpose in that they provide an outlet that relieves the older publications of a crushing volume of material.

Even so, sheer proliferation has of course made it very much more difficult to select publications to which to subscribe, or even to read regularly. Really the only people to benefit in any concrete way from this proliferation are the publishers of secondary publications! For them, the information explosion has been a boon. To the extent that secondary publications can digest the mass of material in primary publications and supply it in useful form, the increase in the number of primary publications may or may not be a crushing burden to the seeker of environmental information. Mr. Rosenthal will tell how secondary services are trying to cope.

A more useful way to categorize scientific and technical publications is as "overtly environmental" and "incidentally environmental." It is the first group that we are primarily concerned with but, as I hope to show, the second group is very important.

For the purposes of this talk, I have broken down each of the two groups into the following types of publications: scientific journals; technical journals; trade press; general magazines; and non-scientific journals. There is a certain arbitrariness in this sort of a breakdown, but there is also some logic as I shall shortly show.

Overtly environmental publications

Let's first take the "overtly environmental" category and go down the list of different types of publications.

First, scientific journals

This group represents the basic current literature in the field. A scientist wishing to publish work that is fundamental in nature and related to an environmental problem would most probably (but not necessarily) approach one of these publications. One of the distinguishing features of publications in this group is that papers are reviewed before publication by several scientists other than the author. This procedure - often known as "peer judgement" - has its disadvantages but it does tend to ensure that anything that is published is scientifically correct and that conclusions are supportable by the evidence presented. In a field as replete with controversy as "environment," this is an important point.

Another distinguishing feature of scientific journals is that they are written "by experts for experts" and consequently there is little or no effort made to make articles in them understandable by anyone not extremely conversant with the particular subject. For instance, a degree in chemistry is not always sufficient equipment to enable one to read and fully understand every paper in my own publication, ES&T. In general, a high degree of proficiency in physical sciences, biological sciences, and mathematics may be needed to get anything at all out of most of the publications in this group. This is, of course, true for the whole of the scientific literature, and not just for that part of it that is "overtly environmental."

As a group these publications are, in addition to being technically advanced, moderately expensive (by that I mean an annual subscription may range from $10 to $50 a year), usually appear monthly, are easily available if you can afford the subscription price but otherwise to be found only in technical libraries. Few public libraries subscribe to these publications and I have yet to see any of them on the newsstand.

In sum, they contain information that is most likely to be accurate, within carefully stated bounds, but not everyone can read them.

A partial list of "overtly environmental" scientific journals is given on the sheets that are available for distribution.

Second: technical journals

There really isn't too much difference between these journals and the purely scientific journals I just discussed. Perhaps the main difference is that the technical journals are at a lower level of technical difficulty than the scientific journals. Even so, they generally require expertise to be read intelligently. Papers in technical journals also are reviewed by outside reviewers, as are papers in scientific journals, with the same net result - some assurance that published papers have a sort of "Good Housekeeping Seal of Approval" from the technical community. The technical journals I have listed are, as it happens, all published by professional associations, and each is aimed primarily at practitioners of some rather specific aspect of environment, such as water treatment or air pollution control. These journals are therefore primarily also in the "by-experts-for-experts" category, but their more down-to-earth technical level makes them somewhat easier to read than scientific journals.

These journals, too, tend to be expensive; the Journal of the Air Pollution Control Association costs $75 per year for nonmembers of the Association. But they are truly excellent reference sources on some subjects, for instance the feasibility of different types of pollution control methods, and could be helpful to diligent laymen, as well as to the professionals for whom they are primarily intended. These publications are usually available in technical libraries, seldom in public libraries, and never, to my knowledge, on newstands. There are no bars to subscribing beyond the rather steep subscription prices.

Third: Trade press

Trade publications are usually characterized by relatively large circulations, relatively low technical difficulty, and modest subscription price. They are published by commercial publishers whose main goal must necessarily be to make a profit. Key to the viability of these publications is a lively market for products and services which can be made the subject of display advertising. Since advertisers are interested in large audiences consisting of people who have both the need and the means to buy their products, the publisher needs to guarantee that large audience. Often, this is achieved through "controlled circulation," a device by which suitably "qualified" subscribers pay nothing to receive the publication. Those whose jobs do not qualify them, may nevertheless subscribe to trade publications; the annual subscription is usually around $10.

Because of the economics of this type of publication, there tends to be more of them in the fields where there is a sizeable dollar market: water and waste treatment is such an area.

I think it fair to say that trade publications in general vary considerably in quality, and "overtly environmental" trade publications are no exception. The best of them are really very good, but the fact that information is usually not subject to technical review (except inasmuch as the editors exert technical judgement) works against their overall stature and credibility. The worst of them can be quite bad and unreliable sources of technical information.

These publications are commonly to be found in technical libraries, and some are found in public libraries (The American City is one that springs to mind). They are easy to read, and this fact alone does commend them to anyone who does not have the training or education to read the more technically advanced journals, subject to the caveats I have mentioned.

Fourth: General magazines

This is a category that has grown in size - in fact grown from nothing - in the past few years. These magazines are aimed at the laymen, or "concerned citizen," and are mentioned here because they do sometimes contain primary information. Technical level is almost uniformly low. The best (in my opinion) is the magazine Environment.

As a group, they are not overly reliable sources of information, and they tend to go off on tangents (such as organic burial), but they are designed to be readable. Although subscription costs are quite low - $10 per year is the norm - it is my feeling that many are struggling financially and we may see considerable attrition over the next year or two. Public libraries often have these publications; Environment seems to have been particularly successful in this regard.

Fifth: Non-scienfific journals

I will mention this group only briefly, because this type of publication is being covered in the socio-economic, management and planning, and legal and regulatory sessions. The nature of the environmental field is such that technical information is at its very core, so that it is hardly possible to discuss an environmental problem without bringing science into the picture. In their various fields, these non-scientific journals have the same strengths and weaknesses as those in the scientific and technical field, namely that the most reliable information is to be found in the least readable publication.

Incidentally environmental publications

Because of the all-pervasive nature of environmental problems and interests, it is safe to say that nearly all scientific and technical primary publications at one time or another carry information that can be characterized as environmental. Thus, all scientific journals based on physical or biological sciences are at least potential, and usually regular, publishers of environmental information. As I mentioned previously, this is the reason why it is so important for these journals to be represented in the data base of environmental information systems and to be abstracted by secondary services.

Regular issues of such scientific journals as Biochemistry, Separation Science, Analytical Chemistry, to take three entirely at random, ordinarily contain several papers of environmental significance. So do the journals serving agricultural science. Since these journals are at a high technical level, however, it takes a trained specialist to dig out the information.

Technical journals and trade publications serving particular professions and segments of industry regularly carry environmental information, especially that which is pertinent to their particular interest. For example, Modern Plastics can be expected to review incinerability of plastics and the role of packaging materials in solid waste. Oil and Gas Journal, a trade publication in the petroleum field, deals on a regular basis with refinery pollution control, auto exhaust emissions and other environmental concerns of the petroleum industry. Civil Engineering, and Chemical Engineering Progress - official publications of two engineering societies - also contain much technical environmental information.

Environmental information - technical and primary in nature - can be found in almost any issue of Scientific American, and even in the business monthly, Fortune.

The rough guides given above for the various types of publications should be used to gauge the potential utility, cost, technical level, and availability of these "incidentally environmental" publications.

To sum up briefly, environmental information is to be found in a staggering number of primary scientific and technical publications. That number is certainly in the hundreds.

The most reliable information (in the scientific sense) is to be found in publications that are the most expensive, the least available, and the most difficult to read and understand. Conversely, publications that are inexpensive, easy to read, and easily available tend to sacrifice accuracy and scientific objectivity. This may be a generalization, but it is sufficiently true to pose very real problems for anyone who is not technically trained and who wishes to mine the very rich ore to be found in the scientific literature.

SCIENTIFIC & TECHNICAL PRIMARY PUBLICATIONS

Notes on Publication Listings

Explanations of Column Headings

Cost:	Annual subscription in U.S. Those affiliated with society or association generally get price break. Foreign subscriptions cost more; institutional subscriptions usually cost more than individual. C.C. means "controlled circulation" -- free subscription to "qualified readers." Those not qualified must pay.
Aimed At:	The primary audience for whom publication is edited. Publications sometimes use jargon and special terms which only its primary audience can understand.
Tech. Level:	Low: can probably be read by educated laymen. Moderate: technical training may be necessary to understand some or all articles. High: specialized technical training essential to understand articles.
Availability:	Indication of whether available on newsstands, in public libraries, technical libraries, or so specialized or to be available only in some technical libraries.
Abbreviations:	**Profs. means professionals (not necessarily professors); Res. means researchers; Sci. means scientists; Off. means officials.**

NOTE: These lists are not claimed to be totally comprehensive. They should be considered only as a guide to technical literature and as indicative of different types of publications.

SCIENTIFIC JOURNALS

Title	Publisher (Year of Appearance)	Frequency	Cost	Aimed At	Technical Level	Availability
Environmental Science & Technology	American Chemical Soc. (1967)	Monthly w/annual directory	$ 9.00	Env. Profs.	Low - High	Technical libraries, Some public librarie
Environmental Pollution	Elsevier (1970)	Quarterly	15.60	Env. Res.	High	Technical libraries
Water Research	Pergamon Press (1967)	Monthly	100.00	Water Sci.	High	Technical libraries
Water Resources Research	Am. Geophys. Union (1965)	Bimonthly	20.00	Water Supply Profs.	High	Technical libraries
Bulletin of Environmental Contamination and Toxicology	Springer-Verlag (1966)	Bimonthly	28.00	Prof. Toxicols.	High	Technical libraries
Atmospheric Environment	Pergamon Press (1967)	Monthly	60.00	Air Pol. Profs.	High	Technical libraries
Environmental Letters	Marcel Dekker (1971)	8/yr.	40.00	Env. Res.	High	Technical libraries
Journal of Environmental Sciences	Institute of Env. Sciences (1958)	Bimonthly	12.00	Env. Res.	High	Technical libraries

See notes on separate sheet

TECHNICAL JOURNALS

Title	Publisher (Year of Appearance)	Frequency	Cost	Aimed At	Technical Level	Availability
Journal Water Pollution Control Federation	Water Pol. Control Federation (1928)	Monthly with 2 extra issues	$35.00	Water Pol. Profs.	Moderate - High	Technical libraries
Journal of the Air Pollution Control Association	Air Pol Control Assn. (1951)	Monthly	$25.00 to non-profit libraries & indivs.	Water Supply Profs.	Moderate - High	Technical libraries
Journal of American Water Works Assn.	Amer. Water Works Assn. (1914)	Monthly	$20.00	Water Supply Profs.	Moderate	Technical libraries
Journal of the Sanitary Engineering Division (ASCE)	Amer. Society of Civil Engineers				Moderate -High	Technical libraries
Journal of Environmental Health	Nat. Env. Health Assn. (1938)	Bimonthly	$ 8.00	Public Health Profs.	Low - Moderate	Technical libraries

See notes on **separate sheet**

TRADE PRESS

Title	Publisher (Year of Appearance)	Frequency	Cost	Aimed At	Technical Level	Availability
Industrial Wastes		Bimonthly	C.C./ $10.00	Ind. Waste Engrs. & Off.	Low - Moderate	Some Technical libraries
Water & Sewage Works	Scranton Publ. Co. (1890)	Monthly	$ 7.50	Munic. Water & Waste Engrs. & Off.	Low - Moderate	Some Technical libraries
Effluent & Water Treatment Journal (British)	Thunderbird Enterprises (1961)	Monthly	$15.00	Munic. Water & Waste Engrs. & Off.	Low - Moderate	Some Technical libraries
Water & Wastes Engineering	Dun-Donnelley (1964)	Monthly	C.C./ $ 6.00	Water Supply Profs.	Low	Some Technical libraries
Industrial Water Engineering	Target Communic. (1963)	Bimonthly	C.C./ $10.00	Water Supply Profs.	Low - Moderate	Some Technical libraries
Pollution Engineering	Technical Publ. (1969)	Monthly	C.C./ $12.00	Ind. Engrs. Management	Moderate	Technical libraries
Waste Age	3 Sons Publ. Co. (1970)	Bimonthly	C.C./ $10.00	Solid Waste Profs.	Low	?

TRADE PRESS - Continued

Title	Publisher (Year of Appearance)	Frequency	Cost	Aimed At	Technical Level	Availability
Environmental Pollution Management (British)	The Nat'l. Mag. Co. (1971)	Monthly	C.C. Only	Ind. Management	Low	?
The American City	Buttenheim Publ. Co. (1909)	Monthly	C.C./ $15.00	Munic. Off.	Low	Technical libraries Many Public libraries
Solid Waste Management	RRJ Publ. Co. (1958)	Monthly	$ 6.00	Solid Waste Profs.	Low	Technical libraries

See notes on separate sheet

GENERAL MAGAZINES

Title	Publisher (Year of Appearance)	Frequency	Cost	Aimed At	Technical Level	Availability
Ecology Today	Ecological Dimensions (1970)	Bimonthly	$ 6.00	Concerned Laymen	Low	Mail Sub. Some Pub. libraries
The Ecologist (British)	The Ecologist Ltd. (1970)	Monthly	$12.00	Concerned Laymen	Low	Mail Sub.
Clean Air (British)	Nat. Soc. For Clean Air (1929)	Quarterly	$ 3.50	Concerned Laymen & Profs.	Low	Some libraries
Environmental Quality Magazine	Env. Awareness Assoc. (1970)	Monthly	$10.00	Concerned Environmentalists "Ecofreaks"	Low	Newsstands ($1)
Environment	Comm. For Env. Inf. (1958)	10 issues/ yr.	$10.00	Intelligent Laymen	Low - Moderate	Technical libraries Many Public libraries

See notes on separate sheet

NON-SCIENTIFIC JOURNALS

Title	Publisher (Year of Appearance)	Frequency	Cost	Aimed At	Technical Level	Availability
Environmental Affairs	Boston Coll. Env. Law Center (1971)	Quarterly	$15.00	Inter-disciplinary Audience Of Profs.	Low - Moderate	?

Technical & Scientific Journals

Bernard D. Rosenthal
President
POLLUTION ABSTRACTS, INC.

There has been a substantial increase in the number of primary sources and publications, i.e. journals, books, technical reports, symposia, academic literature and government documents, both domestic and foreign--that contain information about the environment and related subjects. The volume of literature in number of sources and diversity of content has led to selective dissemination of information (SDI) on most aspects of environmental information.

The secondary publication is the SDI link between a users specific or unrefined information need as he confronts thousands of primary information options. General examples of secondary publications are reviewed in this paper. No evaluation is made of their content in scope or presentation. An attempt is made to highlight the variety of formats, the diversity of sources and to offer the user a guide for evaluating secondary publications.

The value of a secondary publication depends in part on the users understanding of his own needs and objectives. He should understand the objective of a specific secondary publication. Value to the user depends upon (a) how specific the information must be, (b) the scope of the information required, (c) lapse or lag time from publication date of the original document until its appearance in a secondary journal, (d) the expertise of writing technique, (e) ease of use and reference, (f) availability of original document retrieval service, (g) whether the information base can be manipulated to satsify user needs more defined than the presentation in the secondary journal, and (h) the publishing frequency of the secondary journal. Also, is there sufficient information used from the secondary source to justify its cost?

Other values relate to the number of original source documents utilized by the secondary publication, unique subjects covered, and whether foreign documents are included.

Essentially, the secondary publication prior to publishing must (a) collect information by acquisition or request, (b) prepare bibliographic reference for each original source cited and (c) abstract and index, if each mode is part of the publication's character. There are adjuncts and alternatives to secondary publication services. These may exist within or outside the services of a publication. These would include magnetic tapes, microform service, computer printouts, duplication of the original full text source documents (maintaining copywrite restrictions), on-line computer availability and alerting services for early awareness of primary source information.

Secondary journals often include an abstract of an original document. An abstract is a condensation of information and content. The abstract is used as a screening medium to assist the user in deciding whether the original document should be reviewed in its entirety. Some abstracts include data, observations, facts, conclusions, or a mixture of each. Some take the form of being informative, others are explanatory, comparative or selective.

Technical & Scientific Journals

Bernard D. Rosenthal

There are several basic standard reference or access points included in secondary publications. These include:

1. reference code to each reference or citation / title of article
2. author identification
3. author affiliation
4. primary publication source
5. analytics, including date of primary publication, number of pages cited, page references in original document, referrals to charts and other unique information

Each secondary publication has its own method of subarrangement. The user must learn the different arrangements and how to use each most effectively. The subdivisions include indexes with regular issues, annual indexes and possibly cumulative indexes.

Search vocabulary is perhaps the most unique characteristic of each secondary publication. It may also be the most frustrating for the user. Secondary journals have no common thesaurus. They are not common to each other nor are they wholly common to government vocabulary. A descriptor or keyword essential for searching one secondary source may not be relative to searching another secondary source on the same general subject.

The lack of campatibility in arrangement, order of bibliographic data and vocabulary exists within government publications on environmental information as well as in private secondary publications.

What follows is a brief overview of certain publications and sources in the secondary field as they relate to environmental subjects:

AIR POLLUTION ABSTRACTS: Includes more than 1,200 " core" domestic and foreign journals. Implemented by Air Pollution Technical Information Center (APTIC), now part of the Office of Technical Information and Publications, Office of Air Programs (OAP), Environmental Protection Agency (EPA). Covers chemical, physical and biologicial effects of air pollution, and the data on air pollution control.

SELECTED WATER RESOURCES ABSTRACTS: Reviews current reports and articles on water-related aspects of the life, physical and social sciences; and the conservation, control, use, management and other engineering and legal aspects of water. Covers water pollution, water lay, ground water, lakes and estuaries, water yield, watershed protection, waste treatment, water demand, hydraulics and soil mechanics. Compiled by the U.S. Dept. of the Interior. Available from National Technical Information Service (NTIS).

SOLID WASTE INFORMATION RETRIEVAL SYSTEM (SWIRS): Offers information concerning current research and technological developments in the solid waste management field throughout the world. Coverage includes literature published since 1964. Available from Environmental Protection Agency.

Technical & Scientific Journals
Bernard D. Rosenthal

TRANSPORTATION NOISE BULLETIN: Presents abstracts of reports and resumes of research projects dealing with transportation noise. Compiled from records of Transportation Noise Research Information Service (TNRIS), National Academy of Sciences, Washington, D.C.

ASCATOPICS OF INSTITUTE FOR SCIENTIFIC INFORMATION (ISI): Titles, authors, and journal citations on environmental sciences that include air pollution, effects, source & control; biological waste treatment, chemical residues related to soil contamination, food and beverages; noise control, solid wastes, water pollution and other environmental areas. Available from ISI, Philadelphia, Pa.

MEDICAL LITERATURE ANALYSIS & RETRIEVAL SYSTEM (MEDLARS): From Medlar data the Toxicity Bibliography is produced. Emphasis on adverse effects of toxicity and poisoning of drugs and chemicals, pesticides and other environmental pollutants. Available from Government Printing Office, Washington, D.C.

ABSTRACTS ON HEALTH EFFECTS OF ENVIRONMENTAL POLLUTANTS: prepared in conjunction with Biological Abstracts and with BA's BioResearch Index. Emphasis on pesticides and other environmental pollutants. Publication started January-1972. Developed by Toxicology Information Program, National Institutes of Health. Available from BioSciences Information Service of Biological Abstracts, Philadelphia, Pa.

SELECTED REFERENCES ON ENVIRONMENTAL QUALITY AS IT RELATES TO HEALTH: Citations only. Prepared by MEDLARS. Available from Government Printing Office.

ENVIRONMENTAL INFORMATION /ACCESS: Indexing, abstracting and information retrieval service that covers published and non-print information on the environment and related fields. Provides subscribers with an overview of some 450 periodicals, newspapers and other publications; research and retrieval services are available. From Environment Information Center of Ecology Forum, New York. Annual index available.

POLLUTION ABSTRACTS: Indexing, abstracting and information retrieval service. Covers world-wide literature, published and non-circulated, with about 10,000 abstracts annually from 19,000 books, journals, papers, government documents. References from over 11,500 authors. Annual cumulative index. Translations included. Reference by citation number, author, source document and Keytalpha (rotating keywords). Air, water, solid waste, land, noise, fresh water, sewage treatment, contracts and patents. General and technical coverage. Available from Pollution Abstracts, La Jolla, Calif.

There are numerous secondary publications worldwide in certain environmental fields. For example, Informatics, Inc., in a project for EPA's Noise Abatement and Control division, found thirty-five secondary publications involved with abstracting and indexing, United States and foreign, noise information.

There are 46 services worldwide who deal with abstracting and indexing of water resources or water technology, based on Abstracting Services, Science and Technology, The Hague, FID, 1969, Vol. #1.

There is no single reference source to all the secondary sources that relate to environmenta; literature.

The secondary publication has significant value to the user. It (1) alerts the user to the availability of the vast number of primary source documents; (2) exposes this information to the user without requiring the purchase of original source documents; (3) lets the user's rationale determine the importance of the primary material; (4) allows the user to "track" specialized topics, publications, authors, and (5) keeps the user alert to changes in the state-of-the-art of subjects of specific interest.

There will probably be more SDI of environmental information. It will be a result of increased demand for more specific coverage of environmental subjects. The performance of SDI will come from either existing secondary publications or from new publications. The result will be more proliferation of environmental information in the secondary field.

The House Appropriations Committee has held up over $7 million in constructions funds for the controversial Tocks Island dam and reservoir in the Delaware River Valley and directed that the money be used instead to speed land acquisition until environmental questions about the project are resolved.

Style

17 SOLID WASTE

(For air pollution aspects, see 01 Air Pollution; for sewage, see 19 Water Pollution.)

*72-04159 **Activities in Managing Solid Wastes,** Jack DeMarco, EPA, presented at Nat'l Symposium on Food Processing Wastes, Denver, Mar 23-26, 1971, p41 (10) technical report.

*72-04160 **Solid Waste Management in the Food Processing Industry,** Henry T. Hudson, EPA, presented at Nat'l Symposium on Food Processing Wastes, Denver, Mar 23-26, 1971, p637 (18) technical report.
(2 charts, 8 graphs)

*72-04417 **Leachate Prevention and Control from Sanitary Landfills,** Berton E. Mead and William G. Wilkie (N.Y. State Dept of Environmental Conservation), Waste Age, Mar-Apr 1972, v3, n2, p8 (9) technical report.
Examination of sanitary landfill systems finds leachate problems prevalent. Methods of preventing leachate and the role of engineering in the design and operation of a sanitary landfill are outlined, emphasizing: engineering control of the total system; waste quantity and quality influence; hydrological, geological, and topographic considerations; relationship to surrounding area; definition and understanding of leachate; leachate prevention; and control of water. (8 charts, 1 graph, 4 photos, 1 diagram)

*72-04418 **SWRG Shreds Waste for Landfill in Pompano Beach, Fla.,** William Harrison, Waste Age, Mar-Apr 1972, v3, n2, p14 (3) survey report.
Operation of Fort Lauderdale's pulverization and compaction process for solid waste disposal is described. H. Wayne Huizenga of Waste Management, Inc., Ill. explains how machines reduce waste to 10% of its original volume, thus making landfill a superior disposal method in areas of high water and limited cover. (6 photos)

*72-04419 **Construction Techniques for Sanitary Landfills,** Norbert B. Schomaker, Solid Waste Research Div, EPA, Waste Age, Mar-Apr 1972, v3, n2, p24 (4 1/4) technical report.
Techniques for construction and operation of a well-run sanitary land disposal site for solid waste are presented. Explained are: landfill compaction equipment, landfill methods, cell construction, solution of special construction problems, physical effects of landfill and their control, final site utilization, selective excavation and placement, piercing and piling, external loading, and specific site usage considerations. (1 chart, 4 graphs, 1 photo, 1 diagram)

*72-04420 **Demand — Key to the Lock on Recycling,** Fred Berman, President, Inst of Scrap Iron and Steel, Secondary Raw Materials, Mar 1972, v10, n3, p9 (3 1/4) speech.
The history and problems of the U. S. scrap industry are briefly reviewed. The industry's chief problem is one of limited demand and the continuing creation of additional supply, in the name of recycling. (1 photo)

*72-04421 **Basic Resources Recovered from Recycled Metal,** James W. Owens, Dept of Commerce, Secondary Raw Materials, Mar 1972, v10, n3, p16 (3 1/4) speech.
The vital role that secondary materials play in U. S. resource supply is emphasized. Government and scrap industry efforts to solve the abandoned car problem are described. (1 photo)

72-04422 **Power Boilers: The Ultimate Solution for Solid Waste?,** Paul Spaite and Carl Miller, A. M. Kinney, Inc, Power Engineering, Mar 1972, v76, n3, p54 (2) technical report.
About 360 million tons of municipal wastes must be disposed of annually in the U. S. A new system, which profitably converts combustibles in city wastes to solid homogenous fuel for power boilers, could reduce the problem to a small fraction of what it now is. With add-on features, this thermal recovery system can separate and classify noncombustibles for recycling. (1 chart, 1 diagram)

*72-04423 **Land Use Planning and Solid Waste Management,** Robert M. Clark and Richard O. Toftner, Office of Solid Wastes Management Programs, EPA, Public Works, Mar 1972, v103, n3, p79 (2 1/3) technical report.
"A methodology that has been effectively used in design of transportation, water, and wastewater systems" is presented as a solution to urban solid waste management problems. Land use projections, made on the basis of economic, social, and public interest factors, can also predict solid waste generation. Estimates of expected amounts and location of wastes are used to plan transfer stations, disposal and reduction facilities, and reclamation yards. (3 charts)

72-04424 **The Sanitary Landfill in the Subarctic,** Robert O. Straughn, HEW, Arctic, Mar 1972, v25, n1, p40 (9) research report.
During a 2 1/2-year field study of sanitary landfill usage in the Subarctic, temperatures and gas concentrations were observed in an experimental cell and groundwater quality measured on the periphery. Carbon dioxide concentrations peaked during the warmer periods corresponding to minimum oxygen concentrations. No methane was ever detected nor were significant changes in groundwater quality observed. After the study period the cell was opened for examination and showed that little decomposition had occurred. (1 map, 1 chart, 2 graphs, 2 diagrams)

*72-04425 **New Ideas to Close the "Scrap Cycle",** Fred Berman, Scrap Metal Research and Education Foundation, Phoenix Quarterly, 1972, v3, n3, p5 (3 1/3) research report.
A Scrap Metal Research and Education Foundation Study undertaken to pinpoint obstacle which have caused the breakdown of the scrap cycle and to determine opportunities for increased recycling of ferrous solid wastes is described. EPA is now reviewing its conclusions, which indicate a need for cooperation among the iron and steelmaking industry, government at all levels, and the scrap processing industry. (6 photos)

*72-04426 **Government and Consultants — Partners in Environmental Progress,** Richard D. Vaughan, Engineering-Science, Inc, Consulting Engineer, Mar 1972, v38, n3, p99 (3) technical report.
On solid waste problems, the consultant can contract with the Federal government directly for studies and investigations, and R&D projects. Briefly discussed are: major solid waste problems, government role in solid waste management, and a county planning study.

72-04427 **Interactive Computer-based Game for Decision-making in Ecology,** T. I. Peterson and P. N. Wahi, IBM, IBM Journ of Research and Development, Mar 1972, v16, n2, p154 (7 1/2) technical report.
The Ecology Decision Game, developed by IBM for experimental use, is a technique for interrelating computing, management science, mathematics, and APL for training and education purposes. The game is implemented in two modes: an author mode, which permits an author to write his own scenario; and a player mode, which enables a person to play the game. The particular scenario written for the game treats decision-making in solid waste management: three submodules explore progressively more complicated situations that lead to problems over shortest

Style

P Z **6334.** NEDOPRYADKO, D. M., and G. I. FRIDMAN. (Uzhgorod State Univ., Uzhgorod, USSR.) Vliyanie pestitsidov na spetsificheskii tsitoleikoliz i leikergiyu krovi pri eksperimental' noi tuberkulinovoi allergii. [Effect of pesticides on specific cytoleukolysis and leukergy of blood in experimental tuberculin allergy.] GIG SANIT 35(3): 35-39. 1970. [Engl. sum.]--An experimental study of tuberculin allergy in guinea pigs showed that intensification of skin allergic reaction in the course of development of a slow type of high sensitivity is accompanied by a simultaneous augmentation of specific blood cytoleukolysis and leukergy. The appearance of the allergic factor in leukocytes and intensification of their adhesive property precedes development of the skin allergic reaction. The introduction of pesticides (chlorophose, DDT) in doses, that cause no poisoning, to animals before their sensitization and at the period of formation of allergy increased the intensity of the allergic reaction and of cytoleukolysis but diminished specific leukergy. Administration of pesticides to animals with an altered allergic reactivity brought about inhibition of allergic infiltration of the skin and suppression of specific cytoleukolysis and leukergy and increase of nonspecific cytoleukolysis of neutrophils. A differential study of the extent of allergization of various body systems makes it possible to define the mechanism of action of individual external factors on allergic reactivity.--P. L. W.

V Z **6335.** SMIRNOV, V. M. (N. I. Pirogov 2nd Moscow Med. Inst., Moscow, USSR.) K voprosy o roli nadpochechenikov v razvitii anafilaktoidnoi reaktsii u krys. [Role of adrenal glands in the development of anaphylactoid reactions in rats.] VESTN AKAD MED NAUK SSSR 25(3): 72-76. 1970. [Engl. sum.]--The effects of a complementary nonspecific stimulant (4% formalin solution) on the development of anaphylactoid reaction in albino rats induced through parenteral introduction of egg white and development of this reaction after reinjection (in 24 hr) of protein without use of additional stimulant are presented. Adrenalectomized (in a chronic test) and nonoperated female rats, aged 3 mo. were used. Preliminary injection of formalin usually averted development of anaphylactoid reaction, and to the same degree, both in adrenalectomized and non-operated animals. As a general rule, no anaphylactoid reaction developed in response mildly pronounced in both adrenalectomized rats and those with intact suprarenals.--P. L. W.

O X U Z **6336.** SKEP'YAN, N. A., and L. N. GURIN. (Beloruss. Inst. Postgrad. Med., Minsk, USSR.) Khronicheskii bronkhit ot vozdeistviya l'nyanoi pyli. [Chronic bronchitis from the action of flax dust.] ZDRAVOOKH BELORUSS 16(2): 76-78. 1970.--Inhalation tests with acetylcholine were carried out on workers of weaving and texile plants. Inhalation-exhalation capacity was measured at the same time. Sensitization to flax dust was studied by scarificational allergy tests with the flax dust allergen. Chronic bronchitis occurred according to age, action of the dust, and sensitization level in relation to the dust (i. e. allergic reactions). Bronchitis decreased the functional indices of external respiration.--K. P.

U Z **6337.** KAKHETELIDZE, M. G., A. N. SHLYGIN, Z. M. DOLGINA, and R. M. DUBROVSKAYA. (Cent. Inst. Hematol. Blood Transfus., Min. Health USSR, Moscow, USSR.) Leikopoetiny pri asepticheskom vospalenii. [Leukopoietins in aseptic inflammation.] PATOL FIZIOL EKSP TER 14(2): 79-83. Illus. 1970. [Engl. sum.]--Changes of leukopoietic activity of the blood serum of dogs and horses were studied in aseptic inflammation caused by turpentine. Blood became enriched with leukopoietins, which in intact animals stimulates differentiation of stem cells in the direction of granulocytopoiesis, proliferative activity of granulocytes, their maturation and liberation into the peripheral blood. Accumulation of leukopoietins was phasic in character; their maximal amount was revealed in the blood 3 to 7 days after administration of turpentine. Leukopenins depressing the proliferative activity of granulocytes and liberation of mature granulocytes from the bone marrow into the peripheral blood were revealed in some of the serum samples.--P. L. W.

O P U Z **6338.** ZORIN, P. M. Allergicheskii dermatit, voznikshii v rezul'tate kontakta s tsinebom. [Appearance of allergic dematitis due to contact with cineba.] VESTN DERMATOL VENEROL 44(2): 65-68. 1970. [Engl. sum.]--Eighty-six farm workers developed dermatitis after working in fields sprayed with 0.5% suspension of cineba. Hyperemia developed with marked edema and abundant papulous and vesiculous rash in open areas of the skin. In 19 out of 22 patients who had repeated contacts with cineba the developing dermatitis was more extensive and severe in its course. Testing of 54 patients by the compress method with 0.5% suspension of the drug and green leaves of treated plants gave positive results in 41 patients, the test being particularly marked in patients with relapses of dermatitis. Wearing long aprons, oversleeves, stockings and gloves made of thick cloth is recommended as prophylactic measures.--P. L. W.

6339. VIRCHOW, C., and M. DEBELIC. (Hochgebirgsklin., Davos-Wolfgang, Switz.) Hausstauballergie und Dermatophagoides pteronyssinus: Vergleichende kutane und inhalative Testungen. [House dust allergy and Dermatophagoides pteronyssinus: (Comparative cutaneous and inhalation tests between various house dust extracts and mite extracts from Dermatophagoides pteronyssinus).] MUNCHEN MED WOCHENSCHR 112(8): 331-336. Illus. 1970. [Engl. sum.]--Among all antigens tested, house dust extracts most frequently provide positive cutaneous samples. Sensitization to house dust is largely due to sensitiztion to D. pteronyssinus. In extensive cutaneous tests, 95.4% of the patients sensitized to house dust reacted positively to extracts of D. pteronyssinus. Additional, comparative inhalation provocation tests show, in 88.5% of the patients with a positive reaction to inhalation provocation with house dust extract a positive result of the same test with extract of D. pteronyssinus.--P. L. W. V X Z

6340. MAVRINA, F. A. (Med. Inst., Saratov, USSR.) K voprosu o sostoyanii zdorov'ya rabochikh kombikormovykh predpriyatii. [The health of workers in the combined fodder industry.] GEG TR PROF ZABOL 14(10): 50-51. 1970.--Of 72 workers aged 30-60 studied, 58.1% had chronic diseases of the upper respiratory tract and 5.5% had allergic dermatitis. The majority had worked for more than 10 yr. A significant percentage of eosinophilia and the nature of the complaints indicated possible allergization from organic dust and antibiotics. During extended contact with dust from combined fodder, occupational diseases of the skin and respiratory organs can develop. Counterindications for such work are diseases of the upper respiratory tract and lungs, dermatoses, diseases of the gastrointestinal tract and tendencies toward allergic reactions.--N. L. G. O X Z

6341. ROTH, W. G. (Flurst. 17, 85 Nuernburg, W. Ger.) Vermehrte infrarotabstrahlung der Haende bei Patienten nach allergischem Kontaktekzem. [Increased infrared emission of the hands of patients after allergic contact eczema.] DERMATOL MONATSSCHR 156(6): 593-601. Illus. 1970[recd. 1971]- [Engl. summ.]--In 48 patients 1296 measurements of IR emission of skin were made. The cases fell into 2 categories: 24 patients without eczema anamnesis and 24 patients with allergic occupational eczema, which had been medically diagnosed but healed at the time of examination. The comparison of measurement results for both groups showed differences of temperature only in the hand region. Patients from the 2nd group showed a higher IR emission in the hand region than the controls who had never suffered from eczema. Hyperemic tissue is more prone to allergic reactions than anemic tissue which suggests a causal connection between the increased circulation in hands and the tendency to allergic contact eczema.--M. M. H. Z

6342. ARETINSKII, B. V., S. V. KAZANTSEVA, and T. V. KOMPANEITSEVA. Immunologichesko issledovanie krovi bol'nykh khromicheskim pylevym bronkhitom. [An immunological study of the blood of patients with chronic dust bronchitis.] TR TSENT NAUCH - ISSLED PROEKT-KONSTR INST PROFIL PNEVMOKONIOZOV TEKH BEZOP 2. 75-77. 1969.--Translated from REF ZH OTD VYP FARMAKOL KHIMIOTER SREDSTVA TOKSIKOL, 1970, No. 7.54.729.--Immunological reactivity was studied in 23 patients with dust bronchitis, using the direct and indirect Coombs test and the Boyden passive hemagglutination reaction. The frequent appearance of autoantibodies specific for lung tissue in these patients and those with silicosis establishes a pathogenetic relation between these 2 diseases.--S. T. X Z

6343. ORNATSKAYA, M. M. Profilaktika allergicheskikh zabolevanii u detei (obzor literatury) [Prevention of allergic diseases in children (Review of literature).] VOP OKHR MATERIN DET 15(10): 45-48. 1970.--Literature is reviewed on the high frequency of allergic diseases, particularly food allergies, in children. Intrauterine sensitization and its prevention, intake of unchanged milk protein by the intestine and the correlation between skin tests and food allergies are discussed.--N. L. G. F V Z

6344. SZYMCZYKIEWICZ, KONRAD. (Inst. Ind. Med., Lodz, Pol.) Some aspects of pathogenesis of asbestosis. POL MED SCI HIST BULL 13(3): 115-119. Illus. 1970.--A marked similarity exists in biological action of quartz and chrysolite. The crystalline structure of these fibrogenic particles is responsible for their noxious effect. The radiological and histopathological differences encountered in cases [guinea pigs] of pulmonary fibrosis may depend on the various crystalline structures of the fibrogenic particles.--C. M. M. X Z

6345. STARIKOVA, S. K., B. A. KATSNEL'SON, G. V. ARONOVA, and I. M. SHNAIDMAN. (Sverdlovsk Inst. Ind. Hyg. Occup. Dis., Sverdlovsk, USSR.) Uchastie polinuklearov v al'veolyarnom fagotsitoze kvartsevoi pyli i ego svyaz' s biologicheskoi agressivnost'yu kvartsa. [The participation of polynuclears in alveolar phagocytosis of quartz dust and its relation to biological aggressiveness of quartz.] BYULL EKSP BIOL MED 70(9): 113-116. 1970. [Engl. sum.]--In chronic inhalation of quartz dust the ratio between free macrophages and X Z gas exceeded $500\ \mu g\ m^3$ Clinical and epidemiological surveys of respiratory diseases as related to air pollution are reviewed.

Style

72-4TA-**0743**
Reinberg, A (both) Fondation A.-de-Rothschild, Paris, Fr.
Gervais, P
Halberg, Francine (both) Univ. of Minnesota, Minneapolis
Halberg, Franz

Trisentinel monitoring of air pollution by autorhythmometry of peak expiratory flow.
See Citation No. 72-4TA-0703 pp. 217-220. 1971.
Sum., 2 tables, 21 refs. (1 in Du., 2 in Fr., 1 in Ger.), from AS.
AIR MONITORING SYSTEMS : FLOW RATE : SAMPLING TECHNIQUES : autorhythmometry.

Work on healthy subjects and asthmatics and subsequent Parisian studies in a hypo-allergic chamber validate the concept that certain human beings can indeed serve as sensitive, economical, and pertinent monitors of air pollution. More specifically, the removal of man from pollutants into certain clean — if not virgin — environments demonstrates rigorously the biologic effect of pollution, per se, on a variable such as the peak expiratory flow — PEF is the sentinel variable indirectly related to the extent of airways obstruction — by assessing the rhythm-adjusted level of PEF in patients with certain sensitive conditions.

72-4TA-**0744**
Fodor, Georg G (both) Univ. of Duesseldorf, Medizinisches Institut fuer Lufthygiene und Silikoseforschung, Ger.
Winneke, H

Nervous system disturbances in men and animals experimentally exposed to industrial solvent vapors.
See Citation No. 72-4TA-0703 pp. 238-243. 1971.
No abs., 8 figs., 1 table, 28 refs. (1 in Czech., 1 in Fr., 8 in Ger.), from Text.
SOLVENTS : VAPORS : NERVOUS SYSTEM : TOXICITY : INDUSTRIAL EMISSIONS

Investigations with human volunteers and experimental animals have revealed significant disturbances of central nervous system (CNS) functioning caused by low atmospheric concentrations of solvent vapors. Critical flicker frequency depression and vigilance decrement, taken together, seem to be compatible and may be interpreted as indicating a state of CNS-depression. This functional impairment due to solvent vapor exposure occurs at atmospheric concentration far below the present threshold limit value of 500 ppm, which, therefore can't be considered as safe. The application of neurophysiological methods as well as methods of experimental psychology within the framework of environmental toxicology should contribute significantly to a proper evaluation of the potential hazards of chemical air pollutions.

72-4TA-**0745**
Hettche, H. Otto Landesanstalt fuer Immissions und Bodennutzungsschutz, Essen-Bredney, North Rhine-Westphalia, Ger.

Air pollution and lung cancer, a contribution to epidemiology.
See Citation No. 72-4TA-0703 pp. 248-249. 1971.
No abs., 2 refs. (Both in Ger.), from Text.
CANCER : LUNGS : MORTALITY RATE : AIR POLLUTION.

Inductive analysis, coupled with the methods of epidemiology is utilized in relating air pollution to lung cancer. Job mortality rates indicate high cancer danger from flue gases of burning coal, tobacco smoke, exhaust of cars, and probably iron oxide.

72-4TA-**0746**
Heck, W.W. (both) APCO, Raleigh, NC
Tingey, D.T.

Ozone. Time-concentration model to predict acute foliar injury.
See Citation No. 72-4TA-0703 pp. 249-255. 1971.
No abs., 7 tables, 17 refs. (1 in Ger.), from Text.
OZONE : PHYTOTOXICITY : PLANTS : foliar injury.

Experiments designed to predict more accurately acute injury to a selected group of plants from ozone exposures that are limited in time are described. A model presented allows for the prediction of concentrations of ozone that will produce acute foliar injury under variable environmental conditions. The model can be used to suggest combinations of time and concentrations of ozone that should not be exceeded in the atmosphere without injuring specific types of vegetation.

72-4TA-**0747**
Mudd, J.B. (all) Univ. of California, Riversid
McManus, T.T.
Ongun, Alpaslan

Inhibition of lipid metabolism in chloroplasts by ozone.
See Citation No. 72-4TA-0703 pp. 256-260. 1971.
No abs., 5 figs., 2 tables, 22 refs. (1 in Ger.), from Text.
OZONE : PHYTOTOXICITY : PLANTS : LIPIDS : METABOLISM : spinach.

Development of a useful *in vitro* system for the assay of ozon toxicity is discussed. The relative importance of amino acid oxidation an fatty acid oxidation as mechanisms for ozone toxicity is assessed.

72-4TA-**0748**
Hanson, George P. (all) Los Angeles State and Count Arboretum, Arcadia, CA
Thorne, Linda
Jativa, Carlos D.

Ozone tolerance of petunia leaves as related to their ascorbic acid concentration.
See Citation No. 72-4TA-0703 pp. 261-266. 1971.
No abs., 4 figs., 1 table, 29 refs. (1 in Ger.), from Text.
Grant: USPHS AP00132-10.
OZONE : PHYTOTOXICITY : PLANTS : LEAVES : petunias : ascorbic acid.

Petunia plants were studied to determine the relationship between varietal resistance and ascorbic acid concentration. Results indicated th ascorbic acid does serve a protective function in petunia and varieta ozone tolerance is due at least in part to differences in Vitamin C conten The possibility that leaf thickness is an important factor in varieta resistance of petunia cannot be dismissed without further investigation.

72-4TA-**0749**
Guderian, R. (both) Landesanstalt fuer Immissions u Bodennutzungsschutz, Essen-Bredene North Rhine-Westphalia, Ge
Schoenbeck, H.

Recent results for recognition and monitoring of air pollutants with the aid of plants.
See Citation No. 72-4TA-0703 pp. 226-273. 1971.
No abs., 13 figs., 1 table, 24 refs. (21 in Ger.), from Text.
AIR MONITORING SYSTEMS : PLANTS : BIOLOGICAL INDICATORS

Recognition and monitoring of air pollutants by plant analyses an by certain exposure procedures are discussed. The suitability of lowe and higher plants as air pollution indicators is based on the particul sensitivity of some species as well as on their specific reactions to certa pollutants. Thereby the differences in the chemical compositions and activities of the pollutants are revealed by the varying and quantitativ determinable reactions of plants. The presented exposure methods, th test chamber method, the test plant method, the grass culture meth and the lichen exposure method are on one hand suited to recogn biologically affecting air pollutants, and on the other hand to limit a monitor polluted areas.

72-4TA-**0750**
Rao, D.N. Banaras Hindu Univ., Varanasi, Ind

A study of the air pollution problem due to coal unloading in Varanasi, India.
See Citation No. 72-4TA-0703 pp. 273-276. 1971.
No abs., 5 tables, 8 refs., from Text.
DUSTS : COAL : PLANTS : PHYTOTOXICITY : INDIA : Varanasi : Ma : lemon.

The effect of coal dust on the growth and fruiting behavio mango and lemon was investigated. Coal dust in the air is a g nuisance for plants, especially at the time of flowering. It inhibits not o the energy conserving and energy releasing processes in plants interfering with gaseous diffusion, by reducing light intensity, increasing surface temperature, and by disintegrating chlorop pigment; but it also checks the very process of fertilization which is prerequisite for fruit formation. A tree fence of *Pithecolobium dulce* provide an effective barrier as a wind-breaker to keep back partic pollutants.

72-4TA-**0751**
Linzon, Samuel N. Ontario Dept. of Energy and Resou Management, Toronto, C

Fluoride effects on vegetation in Ontario.
See Citation No. 72-4TA-0703 pp. 277-289. 1971.
No abs., 11 figs., 6 tables, 14 refs., from Text.
FLUORIDES : VEGETATION : PHYTOTOXICITY : CANADA : Ontario

Vegetation surveillance studies were carried out during the grow

AGRICULTURAL WASTES

Claybaugh, J. W. Agriculture waste utilization versus disposal. Compost Science, 11(6):18-19, Nov.-Dec. 1970. The utilization of manure as a source of methane gas, fertilizer, or feed nutrients can help solve problems, such as odor, which are associated with its disposal.

[12672]

Style

Dale, A. C., D. E. Bloodgood, and C. M. Robson. Aerobic decomposition of dairy cattle manure. p.187-196. Unpublished data. A decomposition of about 20 percent of the volatile solids at 4 C and about 42 percent of the volatile solids at 24 C can be expected.

[12469]

Frink, C. R. Animal waste disposal. Compost Science, 11(6):14-15, Nov.-Dec. 1970. Although data indicate that manure is not worth hauling to the field as fertilizer, alternative disposal methods are more expensive and could result in considerable ecological damage.

[12671]

Herr, G. H. Agriculture waste research needs. Compost Science, 11(5): 8-11, Sept.-Oct. 1970. Since there are several problems associated with the handling of liquid poultry manure, a Pennsylvania poultry farm has instituted a process whereby the manure is dried and sold as fertilizer.

[12673]

Honda, K. Treatment of livestock waste water by electrolysis. Yosui to Haisui, 12(10):871-878, Oct. 1, 1970. An effective, flexible, and economical method for electrically treating cattle manure in an electrolysis tank has been developed by a Japanese research team. (Text-Japanese)

[12562]

Poch, M., and H. Horn. A new approach to disinfection of liquid manure. Zeitschrift fuer die Gesamte Hygiene and Ihre Grenzgebiete, 16(8):593-594, Aug. 1970. Mixtures containing 60 percent manure, 30 percent urine, 10 percent water, and small amounts of ammonia were found to be strongly antibacterial with regard to gram-negative species. (Text-German)

[12662]

administration & dosage/ *EDTA, therapeutic use/ FEMALE/ HEMATOCRIT/ HOSPITAL OUTPATIENT CLINICS/ HUMAN/ INFANT/ LEAD POISONING, blood/ LEAD POISONING, complications/ *LEAD POISONING, drug therapy/ LEAD POISONING, radiography/ MALE/ PAINT/ PENICILLAMINE, administration & dosage/ PENICILLAMINE, adverse effects/ *PENICILLAMINE, therapeutic use/ PICA/ URTICARIA, chemically induced/ VOMITING, chemically induced

ENZYMOLOGY

2594. Lead and delta-aminolaevulinic acid dehydratase levels in mentally retarded children and in lead-poisoned suckling rats. Millar JA, et al. Lancet 2:695-8, 3 Oct 70
ANIMAL EXPERIMENTS/ ANIMALS, NEWBORN/ BRAIN CHEMISTRY/ CHILD/ CHILD, PRESCHOOL/ HUMAN/ *HYDRO-LYASES, blood/ INFANT/ INTELLIGENCE TESTS/ KIDNEY, analysis/ LEAD, analysis/ *LEAD, blood/ LEAD POISONING, blood/ LEAD POISONING, complications/ *LEAD POISONING, enzymology/ LIVER, analysis/ MENTAL RETARDATION, blood/ MENTAL RETARDATION, enzymology/ *MENTAL RETARDATION, etiology/ RATS/ SPLEEN, analysis

Style

2595. [Activity of delta-aminolevulinic acid dehydratase in men occupationally exposed to lead] Urbanowicz H, et al. Pol Tyg Lek 25:1010-2, 6 Jul 70 (Pol)
AMINO ACIDS, urine/ ENGLISH ABSTRACT/ ERYTHROCYTES, enzymology/ HUMAN/ *HYDRO-LYASES, blood/ *LEAD POISONING, enzymology/ LEVULINIC ACID, urine/ TIME FACTORS

2596. Lead poisoning as a disorder of heme synthesis. Goldberg A. Seminars Hemat 5:424-33, Oct 68
ACYLTRANSFERASES, metabolism/ CHILD/ FECES, analysis/ *HEME, biosynthesis/ HUMAN/ HYDRO-LYASES, metabolism/ IRON ISOTOPES/ LEAD POISONING, enzymology/ *LEAD POISONING, metabolism/ LEVULINIC ACID, metabolism/ LEVULINIC ACID, urine/ PORPHYRIA, enzymology/ *PORPHYRIA, metabolism/ PORPHYRINS, analysis/ PORPHYRINS, urine

ETIOLOGY

2597. [General lead intakes through foodstuffs and beverages] Lehnert G, et al.
Arch Hyg Bakt 153:403-12, Oct 69 (Ger)
ABSORPTION/ AIR POLLUTION/ AUTOMOBILE EXHAUST/ *BEVERAGES, analysis/ ENGLISH ABSTRACT/ ENVIRONMENTAL EXPOSURE/ *FOOD, analysis/ *FOOD CONTAMINATION/ FRUIT, analysis/ GERMANY, WEST/ GRAIN, analysis/ HUMAN/ *LEAD, analysis/ LEAD POISONING, etiology/ MEAT, analysis/ METHODS/ SPECTROPHOTOMETRY/ STATISTICS/ VEGETABLES, analysis

2598. [Unrecognized lead poisoning exposure in maintenance works of a road tunnel] Girard R, et al.
Arch Mal Prof 31:318-9, Jun 70 (Fre)
ENVIRONMENTAL EXPOSURE/ HUMAN/ *LEAD POISONING, etiology/ MALE/ MIDDLE AGE

2599. [Lead poisoning and old statues] Girard R, et al.
Arch Mal Prof 31:309-11, Jun 70 (Fre)
ADULT/ HUMAN/ *LEAD POISONING, etiology/ LEAD POISONING, occurrence/ MALE/ MIDDLE AGE/ *OCCUPATIONAL DISEASES

2600. [Diabetes mellitus in workers exposed to the risk of lead poisoning. I. Diabetes mellitus in typographic workers] Ferrero GP.
Med Lavoro 59:540-2, Aug-Sep 68 (Ita)
*DIABETES MELLITUS, etiology/ ENGLISH ABSTRACT/ HUMAN/ LEAD POISONING, complications/ *LEAD POISONING, etiology/ *OCCUPATIONAL DISEASES/ *PRINTING

2601. Earthenware containers as a source of fatal lead poisoning. Klein M, et al.
New Eng J Med 283:669-72, 24 Sep 70
CANADA/ CERAMICS/ CHELATING AGENTS, therapeutic use/ CHILD, PRESCHOOL/ *COOKING AND EATING UTENSILS/ HUMAN/ LEAD, analysis/ LEAD POISONING, diagnosis/ *LEAD POISONING, etiology/ LEAD POISONING, prevention & control/ LEAD POISONING, therapy/ MALE/ PUBLIC HEALTH/ SOLUBILITY

2602. Lead poisoning--the silent epidemic. Rothschild EO.
New Eng J Med 283:704-5, 24 Sep 70
CERAMICS/ CHELATING AGENTS, therapeutic use/ CHILD/ CHILD, PRESCHOOL/ COOKING AND EATING UTENSILS/ HOUSING/ HUMAN/ INFANT/ LEAD POISONING, diagnosis/ LEAD POISONING, etiology/ *LEAD POISONING, occurrence/ LEAD POISONING, prevention & control/ LEAD POISONING, therapy/ PICA, complications/ UNITED STATES

2603. Two men with lead poisoning. St. George IM.
New Zeal Med J 71:294-7, May 70
ADULT/ CASE REPORT/ *CHELATING AGENTS, therapeutic use/ DIMERCAPROL, adverse effects/ DIMERCAPROL, therapeutic use/ DRUG HYPERSENSITIVITY/ EDTA, adverse effects/ EDTA, therapeutic use/ HUMAN/ LEAD, urine/ *LEAD POISONING, drug therapy/ LEAD POISONING, etiology/ MALE/ MIDDLE AGE/ PENICILLAMINE, adverse effects/ PENICILLAMINE, therapeutic use

2604. [Complicated toxicological situation. Lead and cadmium, 2 small snapshots and comments] Norseth T, et al.
T Norsk Laegeforen 90:1529-31 passim, 15 Aug 70 (Nor)
*AIR POLLUTION, analysis/ ANIMAL EXPERIMENTS/ *CADMIUM, poisoning/ CHRONIC DISEASE/ ENGLISH ABSTRACT/ ENVIRONMENTAL EXPOSURE/ HUMAN/ *LEAD POISONING, etiology/ OCCUPATIONAL DISEASES/ PUBLIC HEALTH/ RATS/ SULFUR DIOXIDE, poisoning/ *WATER POLLUTION, analysis

HISTORY

2605. Sir George Baker and the dry belly-ache. (Baker G), Childs SJ. Bull Hist Med 44:213-40, May-Jun 70
*ABDOMEN/ *COLIC, history/ HISTORICAL ARTICLE/ HISTORICAL BIOGRAPHY/ HISTORY OF MEDICINE, 18TH CENT./ *LEAD POISONING, history/ UNITED STATES

METABOLISM

2606. Electron probe microanalyser localization of lead in kidney tissue of poisoned rats. Carroll KG, et al. Nature (London) 227:1056, 5 Sep 70
ANIMAL EXPERIMENTS/ CALCIUM, analysis/ ELECTRON PROBE MICROANALYSIS/ HISTOCYTOCHEMISTRY/ *KIDNEY, analysis/ *LEAD, analysis/ *LEAD POISONING, metabolism/ PHOSPHORUS, analysis/ PROTEINS, analysis/ RATS

2607. Lead poisoning as a disorder of heme synthesis. Goldberg A. Seminars Hemat 5:424-33, Oct 68
ACYLTRANSFERASES, metabolism/ CHILD/ FECES, analysis/ *HEME, biosynthesis/ HUMAN/ HYDRO-LYASES, metabolism/ IRON ISOTOPES/ LEAD POISONING, enzymology/ *LEAD POISONING, metabolism/ LEVULINIC ACID, metabolism/ LEVULINIC ACID, urine/ PORPHYRIA, enzymology/ *PORPHYRIA, metabolism/ PORPHYRINS, analysis/ PORPHYRINS, urine

OCCURRENCE

2608. Ulcer and gastritis in the professions exposed to lead. Jovičić B.
Arch Environ Health (Chicago) 21:526-8, Oct 70
ADULT/ ENVIRONMENTAL EXPOSURE/ GASTRIC JUICE/ *GASTRITIS, occurrence/ HUMAN/ LEAD/ *LEAD POISONING, occurrence/ MIDDLE AGE/ *PEPTIC ULCER, occurrence/ YUGOSLAVIA

2609. [Lead poisoning and old statues] Girard R, et al.
Arch Mal Prof 31:309-11, Jun 70 (Fre)
ADULT/ HUMAN/ *LEAD POISONING, etiology/ LEAD POISONING, occurrence/ MALE/ MIDDLE AGE/ *OCCUPATIONAL DISEASES

2610. Lead poisoning--the silent epidemic. Rothschild EO.
New Eng J Med 283:704-5, 24 Sep 70
CERAMICS/ CHELATING AGENTS, therapeutic use/ CHILD/ CHILD, PRESCHOOL/ COOKING AND EATING UTENSILS/ HOUSING/ HUMAN/ INFANT/

NAME: Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

TEL: (919) 549-8411

DIRECTOR: Peter Halpin

SPONSOR: Office of Air Programs
Environmental Protection Agency

MISSION: (a) To determine need for collecting air pollution technical information. (b) To acquire, store, retrieve, reproduce, and disseminate needed air pollution technical information including articles, books, periodicals, pamphlets, copy, microfilm, tape or other forms of memory. (c) To coordinate activities with other documentation groups, centers, and libraries, domestic and foreign, to make resources mutually available and to encourage requisite uniformity. Services include: (1) Preparation of a monthly abstract bulletin containing the yield of screening more than 1100 domestic and foreign serial publications, patents, Government reports, preprints, technical society papers, proceedings, etc.; (2) Provision of retrospective literature searches rapidly upon request (about 24,000 records are currently accessible), and handling of inquiries about secondary distribution of the sponsor organization's technical publications; (3) Preparation of extensive bibliographies on special subjects for publication; (4) Provision of translations of foreign journals cover-to-cover (currently "Staub" from the German, and "Hygiene and Sanitation" from the Russian "Gigiena i Sanitariya", and of individual documents requested by the sponsor organization's staff -- the latter are also made available to the public through interlibrary loan or through the National Translation Center; and (5) Provision of conventional library services, primarily for the sponsor organization.

NAME: Analytical Methodology Information Center (AMIC)
Battelle Memorial Institute
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

TEL: (614) 299-8045

DIRECTOR: Ralph L. Darby

SPONSOR: Office of Research and Monitoring
Environmental Protection Agency

MISSION: To acquire, index, and abstract literature related to analytical methods. AMIC publishes a monthly awareness bulletin, responds to special requests for evaluated information on specific topics, and serves the Water Resources Scientific Information Center.

NAME: Division of Health Effects Research
National Environmental Research Center
Environmental Protection Agency
Research Triangle Park, North Carolina 27711

TEL: (919) 549-8411

DIRECTOR: Dr. John F. Finklea

SPONSOR: Office of Research and Monitoring
Environmental Protection Agency

MISSION: Develop intelligence relative to the effects of air pollution on health for inclusion in "Air Quality Criteria Documents" produced by the Environmental Protection Agency.

NAME: Division of Pesticide Community Studies
Environmental Protection Agency
4470 Buford Highway
Chamblee, Georgia 30341

TEL: (404) 633-3311

DIRECTOR: Dr. S. W. Simmons

SPONSOR: Office of Pesticide Programs
Environmental Protection Agency

MISSION: To evaluate the effects of pesticides on human health by collecting clinical and biochemistry information and analyzing it statistically. The program has also a collection of literature on pesticides and their effects on health.

NAME: Ecological Information and Analysis Center (EIAC)
Battelle Memorial Institute
Columbus Laboratories
505 King Avenue
Columbus, Ohio 43201

TEL: (614) 299-3151

DIRECTOR: Ann W. Rudolph

SPONSOR: Battelle Memorial Institute
Columbus Laboratories
Atomic Energy Commission

MISSION: To collect, store, retrieve, and evaluate information and data relevant to bioenvironmental and ecological studies. Subject scope of the EIAC currently includes mathematical modeling of ecosystems, population dynamics, bioenergetics, systems ecology, food-chain studies, and environmental aspects of air, water, and solid wastes pollution.

NAME: Ecological Sciences Information Center
Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830

TEL: (615) 483-8611

DIRECTOR: Carol J. Oen

SPONSOR: Ecological Sciences Division
Oak Ridge National Laboratory
Atomic Energy Commission

MISSION: To develop a base of ecological literature references and data that are relevant to the movement, cycling, and concentration of elements, isotopes, natural materials, and environmental pollutants in different ecosystems.

NAME: Engineering Reference Branch
Bureau of Reclamation
Office of Design and Construction
Engineering and Research Center
Denver Federal Center, Building 67
Denver, Colorado 80225

TEL: (303) 234-3022

DIRECTOR: Warren B. McBirney

SPONSOR: Bureau of Reclamation
Department of the Interior

MISSION: To identify, acquire, index, abstract, store, retrieve, and disseminate information concerning all phases of water resources research and development, with particular emphasis on aspects of irrigation, flood control, hydro-electric power generation and transmission, municipal and industrial water, environmental protection, and related water uses and conservation. To provide current awareness, selective dissemination of information (SDI), and retrospective search capabilities in these subject areas.

NAME: Environmental Hygiene Agency
U. S. Army
Edgewood Arsenal, Maryland 21010

TEL: (301) 671-4315

DIRECTOR: Col. Hunter G. Taft, Jr.

SPONSOR: Preventive Medicine Division
Professional Service Directorate
Office of the Surgeon General
Department of the Army

MISSION: To support the Army preventive medicine program through surveys, investigations, consultant services, and training in environmental hygiene to include sanitary engineering, radiological hygiene, and occupational health. The Agency accumulates, evaluates, stores, and disseminates toxicologic and environmental pollution data for use by the Surgeon General and other Department of the Army staff offices and agencies directed toward Army Pollution Abatement.

NAME: Environmental Information System
Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830

TEL: (615) 483-8611

DIRECTOR: Gerald U. Ulrickson

SPONSOR: National Science Foundation

MISSION: To develop an information system which will make both bibliographic references and environmental data available to scientists and others conducting research in, or making decisions about, the environment. An Environmental Terminology Index (thesaurus) is being prepared.

NAME: Environmental Mutagen Information Center (EMIC)
Biology Division
Oak Ridge National Laboratory
Post Office Box Y
Oak Ridge, Tennessee 37830

TEL: (615) 483-8611

DIRECTOR: D. G. Doherty

SPONSOR: Division of Biology and Medicine
Oak Ridge National Laboratory
Atomic Energy Commission

MISSION: To collect information on the genetic effects of chemicals. This collection includes data on environmental pollutants, drugs, food additives, cosmetics and industrial chemicals.

NAME: Environmental Patent Priority Program Information
Office of Information Services
Patent Office
Washington, D. C. 20231

TEL: (202) 557-3428

DIRECTOR: Isaac Fleischmann

SPONSOR: Patent Office
Department of Commerce

MISSION: At the direction of President Nixon, the Patent Office is giving priority in examination and processing of those patents claimed by their inventors to improve the air, water or soil. The Office of Information Services is publicizing this program to inventors and the public, and providing other information to press, public, patent bar, etc.

NAME: Environmental Technical Applications Center
U. S. Air Force
Building 159
Navy Yard Annex
Washington, D. C. 20333

TEL: (202) 433-3901

DIRECTOR: Col. Richard A. Johnston

SPONSOR: Headquarters, 6th Weather Wing
Headquarters Air Weather Service
Military Airlift Command
Department of the Air Force

MISSION: To provide a centralized capability to collect, store, retrieve, process and analyze environmental data for publication, planning, and technical applications required by the Department of Defense, Army, Air Force, and authorized contractors.

NAME:
Eutrophication Information Program
1324 West Dayton Street
University of Wisconsin
Madison, Wisconsin 53706

TEL: (608) 262-3577

DIRECTOR: Dr. Paul D. Uttomark

SPONSOR:
University of Wisconsin
Water Resources Center

MISSION: The primary goal of the Eutrophication Information Program is to serve the scientific community by expediting the exchange of information and to provide search, referral, and information services in eutrophication and related aspects of the aging or maturing of lakes, reservoirs, and other inland bodies of water. The scope includes the collection of data and information on biological, chemical, and hydrological processes of nutrient enrichment and aging of lakes and other inland bodies of water which result in impairment of water quality by growth of aquatic organisms and plants. Activities include abstracting scientific literature, preparing critical literature reviews, and providing referral services.

NAME: Geologic Division
U.S. Geological Survey
Washington, D. C. 20242

TEL: (202) 343-2125

DIRECTOR: Richard P. Sheldon

SPONSOR: U. S. Geological Survey
Department of the Interior

MISSION: To make geologic examinations to determine and appraise the mineral and mineral fuel resources and the geologic structure of the United States and its territories. A by-product of these examinations is the identification of geologic factors that bear on the use of the land and maintenance of environmental quality. These identifications include such processes as the compositional variations in major and all trace elements (including hazardous elements) of rocks, soils, and plants to provide baseline information on the natural occurrence of the elements, and the geochemistry of the sediments as they move through the coastal waters and onto the shelf.

NAME: Medical Literature Analysis & Retrieval System (MEDLARS)
National Library of Medicine
8600 Rockville Pike
Bethesda, Maryland 20014

TEL: (301) 496-6217

DIRECTOR: Dr. Clifford A. Bachrach

SPONSOR: National Library of Medicine
National Institutes of Health
Public Health Service
Department of Health, Education and Welfare

MISSION: (a) To subject index the periodical literature of medicine and related fields. (b) To publish printed bibliographies of the biomedical literature (Index Medicus and twenty others). (c) To prepare bibliographies by current and retrospective searches of the computer stores of citations of the periodical literature of medicine in response to the expressed needs of individuals in the health professions.

NAME: National Technical Information Service (NTIS)
Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22151

TEL: (703) 321-8543

DIRECTOR: William T. Knox

SPONSOR: Department of Commerce

MISSION: To provide a focal point of contact in the Federal Government through which the results of Government-sponsored research in science, engineering, and business are made available to industry, commerce and the general public.

NAME: National Water Data Program
Water Resources Division
U. S. Geological Survey
Washington, D. C. 20242

TEL: (202) 343-9425

DIRECTOR: E. L. Hendricks

SPONSOR: U. S. Geological Survey
Department of the Interior

MISSION: To measure and quantify the occurrence and quality of the Nation's water resources and the effect of development and utilization on those resources and to make statistical data and summary reports on the water resource available to planners, developers, and managers. Included in the Division's activities are the coordination of certain water-data acquisition activities by Federal agencies and the development of a National Water Data System, through which all water data acquired in the United States, both by Federal and non-Federal organizations, is identified and accessible to all users.

NAME: Nuclear Safety Information Center (NSIC)
Oak Ridge National Laboratory
Post Office Box Y
Oak Ridge, Tennessee 37830

TEL: (615) 483-8611

DIRECTOR: William B. Cottrell

SPONSOR: Oak Ridge National Laboratory
Atomic Energy Commission (AEC)

MISSION: The Nuclear Safety Information Center (NSIC) was established by the AEC as a focal point for the collection, evaluation, cataloging and storage of all relevant information so that this information might be disseminated (by various techniques) to the rapidly expanding nuclear community and thus not only foster utilization of the results of the AEC research and development (R&D) work but also enhance the growth of the U.S. nuclear industry. The scope includes all aspects of nuclear safety, such as general criteria, analysis, and operating systems; accident analysis; environmental surveys; monitoring and radiation exposure of man; siting and containment of facilities; transporting and handling of radioactive materials; reactor transients, kinetics, and stability; nuclear instrumentation, control, and safety systems; effects of thermal modifications on ecological systems; and effects of radionuclides and ionizing radiation on ecological systems.

NAME: Science and Technology Division
Library of Congress
2nd and Independence Avenue
Washington, D. C. 20540

TEL: (202) 426-5674

DIRECTOR: Marvin W. McFarland

SPONSOR: Reference Department
Library of Congress

MISSION: Maintains the largest and most comprehensive U.S. Collection (all fields and all languages) of books, periodicals and technical reports in science and technology. Provides both general and specialized bibliographic and reference service, including comprehensive fee searching service. Provides referral service through the Division's National Referral Center. Publishes bibliographies and directories in many areas of science and technology including numerous subjects concerned with or bearing upon environmental quality.

NAME: Smithsonian Science Information Exchange, Inc.
300 Madison National Bank Building
1730 M Street, N. W.
Washington, D. C. 20036

TEL: (202) 381-5511

DIRECTOR: Dr. David F. Hersey

SPONSOR: Smithsonian Institution

MISSION: To facilitate effective planning and management of scientific research activities supported by U. S. agencies and institutions by promoting the exchange among participating agencies of information on all types of current basic and applied research. This includes the accumulation, organization, analysis, and maintenance of a comprehensive inventory of current research project summaries, and the making of this information available to the scientific community in a form such that maximum use can be made of this data by the scientist and research administrator.

NAME: Solid Waste Information Retrieval System (SWIRS)
Office of Solid Waste Management Programs
Environmental Protection Agency
5600 Fishers Lane
Rockville, Maryland 20852

TEL: (301) 443-1824

DIRECTOR: John A. Connolly

SPONSOR: Office of Solid Waste Management Programs
Environmental Protection Agency

MISSION: To organize for quick retrieval, the published information concerning current research and technological developments in the solid waste management field throughout the world. To update and keep current the Refuse Collection and Disposal Annotated Bibliography series for world-wide distribution. Input to the system began in June 1967. Coverage includes literature published since 1964. Conduct retrospective reviews when necessary. Although the system is not completely automated at this time, the search strategy is presently partially computerized.

NAME: Technical Information Center
Atomic Energy Commission
Post Office Box 62
Oak Ridge, Tennessee 37830

TEL: (615) 483-8611

DIRECTOR: Robert L. Shannon

SPONSOR: Office of Information Services
Atomic Energy Commission

MISSION: To collect, evaluate, organize, catalog and announce the international nuclear science literature. To control, reproduce, and disseminate the report literature of the Atomic Energy Commission and its contractors.

NAME: Technical Information Service Branch
Division of Technical Services
National Institute for Occupational Safety and Health
1014 Broadway
Cincinnati, Ohio 45202

TEL: (513) 684-2693

DIRECTOR: James L. Oser

SPONSOR: National Institute for Occupational Safety and Health
Public Health Service
Department of Health, Education and Welfare

MISSION: Dissemination of scientific and technical information on occupational safety and health. Makes replies to inquiries (received from general public, professional workers, unions and local, State and Federal government agencies) for technical references on health effects, toxicity of chemicals, and health hazards encountered in the work environment.

NAME: Technical Libraries, Tennessee Valley Authority;
Knoxville, Tennessee; Chattanooga, Tennessee;
and Muscle Shoals, Alabama
Technical Library, TVA
500 Union Avenue
Knoxville, Tennessee 37902

TEL: (615) 637-0101

DIRECTOR: Jesse C. Mills

SPONSOR: Information Office
General Managers Office
Tennessee Valley Authority

MISSION: To accumulate, process, analyze, index, publish and otherwise disseminate information on air, water, ground and other types of pollution and environmental quality as they concern the TVA and the Tennessee Valley.

NAME: Toxicology Information Program
National Library of Medicine
8600 Rockville Pike
Bethesda, Maryland 20014

TEL: (301) 496-3147

DIRECTOR: Dr. Henry Kissman

SPONSOR: National Library of Medicine
National Institutes of Health
Public Health Service
Department of Health, Education, and Welfare

MISSION: The Toxicilogy Information Program (TIP) of the National Library of Medicine has the overall mission to set up computerized facilities to "cope with the flood of toxicological information and make it quickly available to people with a legitimate need for it." (Report of a President's Science Advisory Committee, 1966.) TIP's immediate goals are: to establish an on-line interactive retrieval system containing information and data on hazards to man from pesticides, other environmental and occupational toxicants, and drugs; to collect such data from the literature and the files of cooperating industrial and government agencies; to sponsor the publication of state-of-the-art reviews in toxicology; and, through a Toxicology Information Response Center, perform information analysis and reference services in toxicology for the scientific community.

NAME: Transportation Noise Research Information Service
Highway Research Board
National Research Council -
National Academy of Sciences
2101 Constitution Avenue, NW.
Washington, D. C. 20418

TEL: (202) 961-1611

DIRECTOR: Paul Irick

SPONSOR: Office of Noise Abatement
Office of the Secretary
Department of Transportation

MISSION: (a) To develop and operate a storage and retrieval system for transportation noise research information. (b) To provide information syntheses for topics within the program scope. (c) To advise on research and development (R&D) needs and goals in the area of transportation noise abatement.

NAME: Water Quality Technical Data and
Information System (STORET)
Office of Water Programs
Environmental Protection Agency
Washington, D. C. 20460

TEL: (703) 557-7632

DIRECTOR: George F. Wirth

SPONSOR: Technical Data and Information Branch
Applied Technology Division
Office of Water Programs
Environmental Protection Agency

MISSION: The system provides for the collection, storage, retrieval, and analysis of water quality data and other pollution control information. The system uses computer technology extensively. All data and information collected is related to location, water use or user, water quality parameters, pollution control actions, and time.

NAME: Water Resources Scientific Information Center (WRSIC)
Department of the Interior
Washington, D. C. 20204

TEL: (202) 343-8435

DIRECTOR: Raymond A. Jensen

SPONSOR: Office of Water Resources Research
Department of the Interior

MISSION: In accordance with the Water Resources Research Act of 1964, as amended, and assignments by the Secretary of the Interior and the Federal Council for Science and Technology, the Center is to insure a more prompt flow of information to the Nation's water resources community by coordinating, supplementing, and avoiding duplication of information services which are supporting water resources research, engineering, and management.

BULLETIN SYNOPTIQUE DE DOCUMENTATION THERMIQUE

Institut Français des Combustibles et de l'Energie, Centre de Documentation, 3 Rue Henri Heine, Paris 16e, France
1962- , 11x, F. 220.00

2000 abstracts/year, 100 words/abstract, interval 1½ month
coverage: 160 domestic and 160 foreign journals + books, standards, conference papers
arrangement: broad subject categories
subject indexes annually
(abstracts printed one-sided, 80x95 mm)

Heat
Energy
Air pollution
Combustion

ABSTRACTS OF AIR AND WATER CONSERVATION LITERATURE AND PATENTS

American Petroleum Institute, Central Abstracting and Indexing Service, 1271 Avenue of the Americas, New York, N.Y. 10020, USA
1969- , 52x, $ 275.00

2,500 abstracts/year, 150 words/abstract, interval 30 days
coverage: 60 domestic and 20 foreign journals
arrangement: subject groups
no reproduction service

Air pollution
Water pollution

VA-NYTT

K. Konsults Bibliotek, Fack, 10310 Stockholm 2, Sweden
1966- , 10x, Skr. 35.00

1200 abstracts/year, 20-80 words/abstract, interval 2 weeks-3 months
coverage: 200 domestic and 300 foreign journals + books, reports, conference proceedings, standards
arrangement: keywords (16 headings)
bi-annual subject index
(text appearing in more than one language but every item in one language only)
reproduction service

Water and sewage
Air pollution
Refuse handling

APCA ABSTRACTS
Air Pollution Control Association Abstracts

Air Pollution Control Association, 4400 Fifth Avenue, Pittsburgh, Pa. 15213, USA
in cooperation with U.S. Public Health Service (APTIC) and Informatio
Interscience Incorporated
Mack Printing Co., 20th and Northampton Sts., Easton, Pa. 18042, U
1955- , 12x, $ 15.00 ($ 10.00 in U.S. and Canada)

1800 abstracts/year, 250 words/abstract
coverage: 500 domestic and 3500 foreign journals + books, proceeding
arrangement: subject groups
author and title indexes and list of journals annually

Air pollution control research

API ABSTRACTS OF AIR AND WATER CONSERVATION LITERATURE AND PATENTS

American Petroleum Institute, 1271 Avenue of the Americas, New York N.Y. 10020, USA
1969- , 52x, $ 275.00 - 2,000.00 (depending on the gross assets of the subscribing organization)

2600 abstracts/year, 100-200 words/abstract, interval 3-4 weeks
coverage: journals, trade magazins, patents
arrangement: subject groups

Air and water pollution (related to the petroleum industry)

ASPECTS TECHNIQUES DE LA SECURITE ROUTIERE
Fiches documentaires
(1960-1967 Bulletin de documentation)

Fonds d'Etudes et de Recherches pour la Sécurité Routière, Centre International de Documentation sur l'Inspection et la Technique des Véhicules Automobiles (CIDITVA), 14 rue du Gouvernement Provisoire, Bruxelles 1, Belgium
1960- , 4x, gratis or on exchange

1000 abstracts/year, 100 words/abstract, interval 3-6 months
coverage: 40 domestic and 120 foreign journals + non-serial publicatio
arrangement: 15 subject groups
language: English, French or German
card format 9x6 cm
published separately to the primary journal ASPECTS TECHNIQUES DE LA SECURITE ROUTIERE, TECHNICAL ASPECTS OF ROAD SAFET TECHNISCHE ASPECTEN DER VERKEERSVEILIGHEID, TECHNISC SEITEN DER VERKEHRSSICHERHEIT (title in 4 languages)

Road safety. Vehicle control. Traffic regulations
Air pollution

WATER POLLUTION ABSTRACTS

(1927-1949 Water Pollution Research Summary of Current Literature)

Water Pollution Research Laboratory, Ministry of Technology, Elder Way, Stevenage, Herts., U.K.
H.M. Stationery Office, Atlantic House, Holborn Viaduct, London E.C. 1, U.K.
1927- , 12x, £ 3.8.6

2400 abstracts/year, 200 words/abstract, interval 7 months
coverage: 100 domestic and 150 foreign journals + patents, books, reports
arrangement: subject categories
author and subject indexes annually
no reproductions

Water pollution

SCHRIFTTUMSÜBERSICHT LÄRMMINDERUNG

VDI-Dokumentationsstelle, Fachdokumentation Lärmminderung, Postfach 1139, 4 Dusseldorf 1, Germany
1967- , 12x, DM 42,00

600 abstracts/year, 30-60 words/abstract, interval 2-3 months
coverage: 35 domestic and 10 foreign journals + conference proceedings, books, reviews of progress
arrangement: 8 subject chapters
reproduction service

Noise control and measurement
Noise medicine

MITTEILUNGEN ZUR LANDSCHAFTSPFLEGE

Dokumentation - Information
(formerly Mitteilungen über Landschaftspflege)

Bundesanstalt für Vegetationskunde, Naturschutz und Landschaftspflege, Heerstrasse 110, 532 Bad Godesberg, Germany
Verlag Helios Diemer KG, Rheinallee 1, 65 Mainz, Germany
1954- , 4x, DM 30.00

800 abstracts/year, 50-150 words/abstract, interval 6-10 months
coverage: domestic and foreign journals (67% domestic, 33% foreign) + books, annual reports, conference papers
arrangement: own classification
subject index for each issue
(printed single sided)

Nature and wild life protection
Control of water. Soil and air pollution
(Landscape planning. National parks)

B&L LITERATURHINWEISE

Firma Bran & Lübbe, Muhlenkamp 59, 2000 Hamburg 39, Germany
1956- , 52x, gratis to specialists

550 abstracts/year, 70 words/abstract, interval 3 months
coverage: 42 domestic and 6 foreign journals + patents, reports, cor
rence papers, standards
arrangement: by source journals

Water purification. Waste water treatment
Pumps (metering and proportioning)

WASTE MANAGEMENT RESEARCH ABSTRACTS

International Atomic Energy Agency, Division of Health, Safety and Waste Management, Kartnerring 11, 1010 Vienna, Austria
1965- , 1x, gratis

190 abstracts/year, 200 words/abstract
coverage: research completed or in progress in 17 IAEA member countries
arrangement: 5 subject groups, 9 subdivisions
language: English, French, Russian or Spanish
no reproductions

Waste management

CHEMICAL ABSTRACTS

Chemical Abstracts Service, a Division of the American Chemical Society
The Ohio State University, Colombus, Ohio 43210, USA
1907- , 52x, $ 1,950.00 (full service), $ 1,450.00 (educational grant)

250,000 abstracts/year, 200 words/abstract
coverage: 12,000 journals + patents (issued in 26 countries), books, conference proceedings, government research reports
arrangement: subject groups with cross references
subject (keyword), author, numerical patent and patent concordance index in each issue; volume indexes (at the end of a volume period of six months) consist of: subject index, numerical patent index, patent concordance, author index, formula index, index of ring systems, hetero-atom-in-context index
complementary services: computer-produced CHEMICAL TITLES (bi-weekly, 5000 titles from 650 journals/issue, $ 60,000/year, also available in computer-readable form), CHEMICAL-BIOLOGICAL ACTIVITIES (CBAC), POLYMER SCIENCE AND TECHNOLOGY (in two parts)

LITERATURRUNDSCHAU

Elektro-Watt, Bibliothek, Postfach Zurich 8022, Switzerland
1954- , 20x, on exchange

3000 abstracts/year, 30 words/abstract, interval 14 days
coverage: domestic and foreign journals
arrangement: UDC
no indexes
reproduction service

Electric power
Traffic
Water treatment. Water resources

NATIONAL ENVIRONMENTAL INFORMATION SYMPOSIUM
September 25-27, 1972 - Cincinnati, Ohio
SCIENTIFIC AND TECHNICAL SESSIONS

DOCUMENT SERVICES

By William T. Knox, Director
National Technical Information Service
Department of Commerce

In this paper it is assumed that the needed references i.e., title, report/document number, date of publication, and publisher, have been obtained for the desired documents by using the primary and secondary services (journals, indexes, etc.) described by other speakers. The problem addressed is limited to how to obtain a full text copy of the reference from the numerous document services handling environmental information.

Any discussion of document services as broad as our coverage must be preceded by some general statements:

1. This discussion can only serve as a brief introduction to the multitudinous, overlapping, variable quality set of document services in the United States.
2. The professionals in this field--the company, public and university librarians--can provide valuable assistance. Their services should be used as the preferred starting point.

3. If an effort to find the information in one format or through one reference is unsuccessful, the information should be sought in another form or through other references.

The document services provided by the industrial and university libraries are well known to their users. Typically, such libraries serve only members of their own organizations, but will assist other libraries seeking documents. Public libraries vary widely in the scope of their collections and in the services offered. However, they have the potential for more adequate document services, and should be a primary contact for document seekers.

Because of their size, scope, and relative lack of public knowledge about them, the document services provided by Federal agencies are the subjects of this paper. People seeking documents from Federal agencies have two general methods to obtain them: 1) receiving the documents as they are initially published by the agency (so-called initial distribution), and 2) getting the documents from a secondary distributor.

First, however, a word about Government publications, since these are a major part of the services provided. Much important environmental information is to be found in the reports, bulletins, hearings, laws, and other publications issued by the Federal Government, covering topics in nearly all fields of knowledge. Government documents or publications continue to grow in number and significance, and they have become increasingly important tools for educators, researchers, and policy makers. Some titles have established impressive sales records, reflecting public recognition of their helpfulness.

The documents are, however, published in complicated forms and sets, and must be located through the use of printed catalogs, bibliographies, indexes, and services provided for the purpose, some of which will be discussed later. To obtain an overview of the breadth and scope of these Government publications, the frequent user should familiarize himself with some of the many books that have been written on the subject. Schmeckebier, L. F., "Government Publications and Their Use", Brookings Institute, Washington, D.C., 1969, and "U. S. Government Serials and Periodicals", Documents Index, McLean, Virginia, 1972, are two examples.

Initial Distribution

Many agencies maintain mailing lists in order to send their new publications to organizations working in similar fields or on similar problems. There are no uniform methods for getting on these mailing lists; agencies have varying practices and policies. Usually, those individuals or organizations have a contract or grant in a subject field are able to get publications in that field. Others may have to locate the responsible office in the issuing agency, and prepare a written justification for receiving the material.

The Superintendent of Documents also operates the "Federal Depository Library Program", under which 1074 libraries across the nation receive, automatically and free of charge, Government publications in all or selected categories. Categories especially significant for environmental information include publications from: Air Programs Office (EPA); Council on Environmental Quality (Executive Office of the President); and the Environmental Protection Agency. The United States Government Organization Manual 1971/72 lists more than 20 other "Environmental-Information Sources".

A listing of depository libraries is available in almost any public library. A pamphlet entitled "Government Depository Libraries -- The Present Law Government Designated Depository Libraries" (revised April 1972), can be obtained by writing to the Superintendent of Documents, Washington, D. C. 20402.

Some 68 public and university libraries receive publications directly from NASA and the Office of Education in the form of a "document collection". To qualify for this type of document service a library would normally submit an application to the agency justifying its request. Of course, all these documents are also available both to unqualified libraries and to the general public from the National Technical Information Service and other organizations through the mechanism of a standing order.

Secondary Distribution

The Superintendent of Documents (SoD), the National Technical Information Service (NTIS) and the Library of Congress (LC) are the major Federal secondary sources from which the public may purchase document services. As in the private sector, and as a result of the scope and complexity of the Federal publications program, there are no clean-cut distinctions between the SoD and NTIS publications offerings. In general, however, SoD tends to handle large volume items and NTIS handles the more specialized, low volume items. Further differentiating characteristics are outlined in the following discussion.

SoD sells through mail orders and Government bookstores over 27,000 "in-print" different publications which originated in various Government agencies.

The _Monthly Catalog of United States Government Publications_, which announces about 20,000 new documents each year, is published by SoD. The technical reports published by Government contractors and grantees, and documents printed in agency (GPO) field printing plants are typically not included in the _Monthly Catalog_. They are available through NTIS.

An index is included in each issue of the _Monthly Catalog_, and the December index is cumulative for the year. All publications are indexed by subjects currently of interest, with cross-references from all key words in the title. Title entries are used when the subject is not apparent to the indexes from the title. The name of the writer, reporter, editor, etc. is used when it appears in the publications.

Of the 1600 documents announced in a recent issue of the Monthly Catalog, approximately 66% were available in Depository Libraries, 53% could be purchased from the Superintendent of Documents, and 32% were available only from the issuing office (free or for sale).

SoD also publishes Price Lists, e.g., Ecology PL88, that are revised from time to time. These lists, available in selected subject fields, free of charge on request to SoD, show the availability of documents at the time of going to press. Supplies of all publications at SoD are limited, and it is not uncommon that an ordered publication is found to be "out of print".

SoD bookstores are listed below:

Washington, D. C. --

Main Bookstore, 710 North Capitol Street
Commerce Department, 14th & Constitution, N. W.
Pentagon Building, Main Concourse
State Dept., 21st St. and Virginia Ave., N. W.
USIA, 1776 Pennsylvania Ave. N.W.

Atlanta, Ga., Federal Office Bldg., 275 Peachtree St., N. E.
Boston, Mass., John F. Kennedy Federal Building

(more)

Chicago, Ill., Federal Office Bldg., 219 S. Dearborn Street
Dallas, Texas, New Federal Bldg., 1100 Commerce Street
Kansas City, Mo., Federal Bldg., 601 East 12th Street
Los Angeles, California, Federal Bldg., 300 N. Los Angeles St.
San Francisco, California, Federal Bldg., 450 Golden Gate Ave.,
P. O. Box 36104

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The National Technical Information Service and its predecessor organizations have been providing document services since 1945. It is probably the world's largest specialty publisher. All of the NTIS collection of 700,000 different documents, dating back to about 1950, are available for sale. Arrangements with hundreds of organizations, mainly Federal Government agencies, provide an additional 60,000 new reports each year. For example, through the Council on Environmental quality, NTIS receives and makes available to the public all of the Environmental Impact Statements. Other documents relating to the environment are received from the Environmental Protection Agency, the National Oceanic and Atmospheric Administration, and other agencies working in related fields.

NTIS publishes a comprehensive semi-monthly abstract journal, Government Reports Announcements (GRA), to announce all of the 60,000 reports it receives each year. A companion journal, Government Reports Index (GRI), has five separate indexes, subject, personal author, corporate author, report number, and contract number. An annual index is also published.

Of more direct interest to this audience may be one of the new, easy-to-scan, weekly subject-oriented abstracts bulletins--"Weekly Government Abstracts". Six titles in this series are already available and others are contemplated. One bulletin is entitled Environment Pollution and Control, and is available on annual subscription. It includes abstracts of all Environmental Impact Statements.

"NTISearch", a relatively new NTIS service, provides a comprehensive search of the total NTIS collection in answer to specific questions. NTISearch employs an on-line computer search system and results in printed lists of document abstracts pertinent to the question. Searches are based on key words (descriptors) assigned to all documents entering the system. A typical document is indexed by 12 terms, which gives NTISearch a retrieval capability for surpassing that of the printed NTIS indexes. The documents located by NTISearch are available from NTIS.

As required by law (15 U.S.C. 1151-57), NTIS recovers its operating costs from it sales income.

NTIS maintains retail sales facilities at:

5285 Port Royal Road
Springfield, Virginia 22151

and

U.S. Department of Commerce
Room 1098, 14th & E Sts., N.W.
Washington, D. C. 20230

The Library of Congress also provides document services that are of interest to the environmentalist. In addition to its vast holdings of commercially published materials it has extensive holdings of federal, state and local government publications. All federal agencies in the Executive Branch send copies of all of their publications to the Library of Congress.

The Library publishes the Monthly Checklist of State Publications, available on subscription from the Superintendent of Documents. A proposal requiring states to send copies of their official publications to the Library of Congress is included in 1971 Suggested State Legislation, issued by the Council of State Governments. This annual publication contains drafts of constitutional provisions and statutes to assist states considering such legislative action.

At present, 21 states have enacted laws requiring distribution of specified types of publications to the Library of Congress, and 9 have laws requiring at least one copy of each state publication to be sent to the library. This type of legislation has proven to be an effective means of broadening the coverage of the "Checklist". The number of documents listed increased nearly 15% during FY 1971, and the circulation of the "Checklist" passed the 4,400 mark.

The Federal Documents Section and the Science and Technology Division of the Library of Congress can provide reference services and be of assistance in locating documents through the use of their card catalogs. The Photoduplication Service will generally make photoduplicates of materials in the Library's collections available for research use. It performs the service for researchers in lieu of loan of the material, or in place of manual transcription. Certain restricted material cannot be copied. The Library reserves the right to decline to make photoduplicates requested, to limit the number of copies made, or to furnish positive prints in lieu of negatives. Copyrighted material will ordinarily not be copied without the signed authorization of the copyright owner. Exceptions to this rule may be made in particular cases. All responsibility for the use made of the photoduplicates is assumed by applicant.

The National Library of Medicine, Bethesda, Maryland, collects information materials exhaustively in some 40 biomedical areas and, to a lesser degree, in many related subject fields. Its computer-produced "Index Medicus" is a comprehensive subject-author index to articles from approximately 2,200 world-wide journals. To provide rapid dissemination of this information, the Library has been developing a network arrangement through which interlibrary loan services can be shared more efficiently in the United States. At present, the network consists of eleven Regional Medical Libraries. Most of the literature in the collections is available on loan through any library: Interlibrary loan requests should be submitted through a local library. Requests may be submitted by mail or by TWX.

Also, NLM's Toxicology Information Program is of special interest. Begun in 1967, this program provides a national focal point for access to information on toxicology. "Toxicity Bibliography" began quarterly publication in 1968. Other services include organizing a toxicology vocabulary and maintaining a roster of expert advisers.

More specific information about any of the NLM services may be obtained from the Office of Public Information, National Library of Medicine, 8600 Rockville Pike, Bethesda, Maryland 20014.

The National Agricultural Library has extensive holdings of over 2 million volumes, including literature in 50 languages from 200 foreign countries. Special collections cover soils and fertilizers, pest control and pesticides, and many others. The Library publishes indexes and bibliographies in its subject fields. It also provides the magnetic tapes that are used to produce the "Bibliography of Agriculture", a monthly index to the world's literature on agriculture and related chemical and biological subjects. Reference services are available by letter, telephone, and teletype, as well as in person, and the Library will supply copies, for a service charge, of materials in its collection. NAL, however, does not distribute the U. S. Department of Agriculture publications. Request for these should be addressed to:

Office of Information
Administration Building, Room 502
U. S. Department of Agriculture
Washington, D. C. 20250

In addition, most Federal departments and agencies have their own libraries, or information centers. These libraries contain copies of the agencies' documents along with other publications of interest to the mission of the agency. Again, in most cases these collections may be used by the public. The following would be of particular interest to this audience:

U. S. Department of Interior
Natural Resources Library
19th and C Streets, N.W.
Washington, D. C. 20240

- - -

National Oceanic & Atmospheric Admin.
Atmospheric Sciences Library
8060 Thirteenth Street
Silver Spring, Maryland 20910

- - -

National Oceanic & Atmospheric Admin.
Marine and Earth Sciences Library
6001 Executive Boulevard
Rockville, Maryland 20852

- - -

The Library Systems Branch, Environmental Protection Agency, has prepared an extensive listing of "Environmental Libraries" that will facilitate access to the appropriate collection.

A 1970 publication sponsored by the Office of Education entitled "A Study of Resources and Major Subject Holdings Available in U. S. Federal Libraries Maintaining Extensive or Unique Collections of Research Materials", may also be of help. This document is available as ED 043350 from:

ERIC Document Reproduction Service
Leasco Information Products, Inc.
Bethesda, Maryland 20014

Services available may vary from library to library, but generally speaking, services are rendered to private individuals as well as to libraries, other Government agencies, and other organizations. These services usually include the use of general reference tools and current periodicals, and assistance from the professional staff. A number of the libraries have coin-operated electrostatic copying machines available for use by the public.

More than 3,600,000 U. S. patents have been issued for mechanical, electrical and chemical inventions. These patents contain much invaluable information, and are a stimulus to further invention. The Official Gazette of the United States Patent Office, published weekly, contains an abstract and key drawing for each patent granted during the week, and also has helpful indexes. The "Gazette" is a convenient device for obtaining information about available patents. Printed copies of any patent, identified by its patent number, may be purchased from the Patent Office, Washington, D. C.

The complete specification and drawings of all newly issued U. S. patents are also available on 16mm microfilm from NTIS. This service is furnished by subscription only.

As a new, special service, NTIS now announces Government-owned patents and patent applications that are available for licensing, in its Weekly Government Abstracts series, and Government Reports Topical Announcements.

Until this point, publications intended for public release at the time of printing have been the topic of discussion.

There is, however, also a class of documents which can be called "internal documents"; this would include working papers, preliminary reports, minutes of meetings, etc. Some internal documents may be obtained from the issuing agencies by following the procedures specified in the "Freedom of Information Act" (Public Information Section of the Procedure Act, June 1967). This act also defines when a document may be withheld from the public and requires that each agency publish in the Federal Register the office to be contacted and the procedures to be followed when requesting information.

In 1970 a two volume compilation of these procedures (Legally Available U. S. Government Information as a Result of the Public Information Act) was published by Output Systems Corporation, Arlington, Virginia 22202.

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Thus ends a brief exposure to the world of document services. To cover this subject in adequate detail, time equivalent to a three-credit one-year college course would have to be spent. It is spent, in fact, by professional librarians. Therefore, I again stress the importance of utilizing the services of the professional staff members in the libraries and information centers.

Marvin W. McFarland
Chief, Science and Technology Division
Library of Congress

My role in this Symposium is to fill you in on non-bibliographic--that is, non-documentary--information services, including referral activities. It may seem a bit illogical that a person from the library community--the bibliographic community, par excellence--should have been assigned this task. Actually, it is not so peculiar. First, because the Library of Congress is the site of, and operates, the National Referral Center and, second, because libraries have traditionally always rendered referral services when it was necessary or appropriate to do so, although not on an organized, systematic basis. The fact of Library involvement in seemingly non-library activities also serves to point up the complexity of the information world which simply cannot be divided into neat and tidy categories and functions without overlaps, duplications, and even conflicts. For you, the users, it is therefore still very much a "caveat emptor" situation, though we might render that not necessarily literally, "Let the buyer beware," but rather, "Let the user be aware." To give you, the users, information which will let you become aware of the complexities as well as the potentialities of information services is of course one of the main objectives of this meeting.

REFERRAL ACTIVITIES AND OTHER NON-BIBLIOGRAPHIC INFORMATION SERVICES.

Outline

I. Introductory Remarks

II. The Referral Concept

III. The National Referral Center

    1. Its Functions

    2. Services:

        a. Directories, General and Special

        b. Inquiry service

        c. Selected lists

IV. The Science Information Exchange

V. Prospects and Problems

    1. The national network

    2. International cooperation

The Referral Concept

The idea behind referral services is very simple. It is to provide a mechanism capable of responding accurately and promptly to the question: "Where can I find information about ______?" The service--though not yet on an on-line or self service--may be thought of as analogous to the yellow pages in the telephone directory. It is distinct from reference service in that it does not provide answers in the form of substantive information. It does not tell you "what." It tells you "where" or "from whom" and "how."

It sounds easy, doesn't it? In theory, that is. In practice, the provision of useful referral service is difficult and comparatively expensive. The analogy with the yellow pages of the phone book, like most glib analogies, is attractive and provocative but false. The yellow pages are (1) a functional or occupational categorization of the telephone company's subscriber list and (2) a form of advertising for which subscribers pay. This locator service, which is profitable to the telephone company and to the subscriber alike, is a fairly obvious and fortuitous--as well as nearly gratuitous--by-product of the operation of a public utility with a large "other"-oriented data base.

A referral service is a different ball of wax entirely. Within whatever subject field or area of endeavor it is to operate, it must develop an accurate data base which describes potential information sources. It must collect and verify in-depth factual information about those candidate sources. Usually, it must do this from scratch, for supposedly ready-to-hand, off-the-shelf aggregations of information about information sources are almost invariably inaccurate, incomplete, or out-of-date, or all three. When an information source has been fully described and its capabilities confirmed, it becomes, in our terminology, an information resource.

A further significant difference between a referral service, as we see it, and the yellow pages is that the user has many more use options. He may, of course, consult a book-form directory and negotiate his business directly with the listed information resource or resources. In addition, and a most important addition it is, he may write or, preferably, telephone the referral center and avail himself of the personal attention and expertise of a referral specialist competent in at least the general and in many cases the special area of his interest.

Let's turn to specifics and see how the system works at the National Referral Center in the Library of Congress.

The National Referral Center

At the request of the National Science Foundation and with NSF funding, The National Referral Center for Science and Technology was established in 1962 as a division of the Reference Department of the Library. It began operation on March 1, 1963, nearly 10 years ago.

In August 1967, following notification by the National Science Foundation of the withdrawal of funding support, the Center was merged with the Library's Science and Technology Division. Today the Center is a function rather than a unit of that Division, and since 1969 has been financed by funds appropriated by Congress directly to the Library. Its services, like those of most other Library activities funded by Congress, are free. Its publications, like most Government publications, are sold at a nominal figure, by the Superintendent of Documents, Government Printing Office.

The National Referral Center has three basic tasks:

1. To inventory all significant U. S. information resources in science and technology;
2. To provide any organization or individual working in science and technology, on request, with information regarding these resources;
3. To compile and publish directories and other listings of scientific and technical information resources.

Regarding the first task, NRCST defines "information resource" in the broadest possible terms to include any facility, collection, or service maintained on a continuing basis that provides data or material of any kind in any form that may help satisfy the information needs of members of the scientific community--in short, any organization, group, service, library, center or even individual from which or from whom authoritative technical information is available.

Regarding the second task, NRCST acts as a clearinghouse; it does not provide substantive answers to questions, but instead serves as a kind of technical equivalent of the telephone directory's "yellow pages," directing inquirers where to go for reliable, expert information on particular topics.

The third task is actually an extension of the Center's referral services although, in a sense, it competes with them. Publication and dissemination of directories was originally intended to increase general familiarity with existing services and thereby decrease reliance upon individual requests to the Center. Experience has shown referral requests are stimulated by the publication of directories.

In constructing the inventory, a major problem has been to convey to the organizations and institutions that have been solicited to provide input just what is meant by the term "information resource." To be meaningful within the referral clearinghouse concept that underlies the Center, the definition must be highly flexible and go beyond the obvious, the conventional, and the merely formal. The Center's purpose is not to duplicate what libraries and information centers are already doing and are organized and equipped to do; it hopes to go beyond that both in variety and specificity--to make ever more precise linkages between the user and the place where the highly specialized information that the user requires is to be found. Hence, the broad definition.

In order to get precise definitions or descriptions from all elements that are to go into the inventory, the Center uses a questionnaire which the resource, or the people at the resource, fill out, hopefully in the fullest possible detail. The inventorying process aims to discover what sort of information an information resource deals with, how it deals with it, how its information may be obtained, or used, or accessed, by anyone needing that information, and to learn how much it costs, if it costs anything, and so on. The inventorying process then analyzes in depth, in terms of the response to the questionnaire, each information resource and establishes for the file, and therefore for the user the most comprehensive and accurate profile that can be achieved.

When the Referral Center in its early days sent out its questionnaire there was an understandably large amount of misunderstanding of its purpose. Reports from professional societies, for example, would come back stating the titles of publications issued but giving no statement of the information services, if any, the society was able and willing to provide to inquirers who might ask questions, possibly as a result of using the society's publications. Universities would write back listing their libraries and library collections but omitting all mention of research groups, experiment stations, institutes, and the like, which were associated with or a part of the university. By painstaking correspondence, telephone conversations, or personal visits with the information resource under consideration, the Referral Center has been able to iron out many of these initial difficulties.

The second major problem was in making clear to information resources being brought into the system and to users that the Referral Center refers, that it tells inquirers where to apply to obtain the information that is needed; it does not itself supply the substantive or biliographic information. The function of the Center is not that of a reference service--it does not meet requests for assistance by citing a specific publication or by preparing a list of bibliographic sources.

There is one exception to this: the Referral Center in its replies to requesters does cite abstracting and indexing services, which it regards as essentially indistinguishable from the producers of such services and therefore legitimate "referral points" by Referral Center definition. Other regular publications are of interest to the Center only to the extent of their titles, which may be quoted in connection with referral to the issuing agency, in case the requester indicates a desire to become a subscriber or to apply to be put on a free mailing list.

If creation of the inventory or register of information resources was the first task of the Center, the publication of book-form directories was a close second. It was hoped that these directories would not only provide source information in the "cold-turkey" manner of the printed page but would also stimulate direct person-to-person contact between members of the scientific and technical community and between that community and the private sector. We cannot prove it statistically but we believe that there has been this effect.

We have an exhibit at this meeting where you can examine some of our publications, obtain copies of literature describing our activities and services, and ask questions--and hopefully receive useful answers--about our work. I am therefore not going to go into detail about our publications. The Center has published seven book-form directories of its own to date and one special directory for COSATI Panel 6. The latter is entitled, Directory of Federally Supported Information Analysis Centers; it may be purchased as PB 189-300 from NTIS ($3.00, hard copy; $.95 microfiche).

The Center's first two directories were very general. The first, a hurry-up job, came out in January 1965 and, in 1100 entries, purported to cover information resources in the U. S. in the physical sciences, biological sciences, and engineering. That might be laughable were it not for the fact that in the six years of its availability that directory was twice reprinted by the GPO and sold more than 18,000 copies, 50% more than any other directory we have published. The second directory, Social Sciences, approved in October 1965; it sold 12.4 thousand copies in five and a half years.

A third general directory, containing more than 1600 information activities within or supported by the Federal Government, appeared in June 1967. This directory was compiled at the urgent prompting of the National Science Foundation to fill a long-felt need which had been highlighted in the recommendations of the famed Weinberg Report (Science, Government, and Information) back in January 1963. Curiously, it was the most difficult to compile of all the Referral Center's publications. Why? Because of the slow, half-hearted, and even slipshod response of many Federal agencies to the Center's efforts to elicit the facts about the agencies' information activities, capabilities, and services. Incidentally, we are revising and updating that directory at the present time and find that the attitude of the Federal community has changed very little.

From the outset, the Referral Center planned to issue directories relating to specific subject areas of timely interest. As the problems of the environment were already commanding national attention, it is hardly surprising that the two NRC special directories compiled to date are entitled Water (September 1966) and General Toxicology (June 1969). The Toxicology directory was produced with support from the Toxicology Information Program of the National Library of Medicine.

For the past several years, much of the Center's efforts have been devoted to the conversion of the information resources data base to machine-readable form and to the production of revised and updated general directories with the use of the Library of Congress IBM 360-70 computer and the Linotron high-speed photocomposition equipment of the Government Printing Office. To date, two general directories have come off the press. Physical Sciences; Engineering appeared in June 1971. Biological Sciences came out just last week. Social Sciences and Federal Government are expected in the Spring of 1973.

I repeat that the Referral Center has an exhibit here at the Symposium which you are all invited and urged to visit. The exhibit will give you a far better idea of the Center's publications and services than I can give by merely talking about them.

I do not wish to overemphasize publications, because they are not really "where the Center is at." We are concerned with getting people in touch with people, with the communication of facts and ideas from one human mind to another. I have already said that publications are one means of effecting such contact but they are a "cold turkey" means.

It is difficult to assign values and assess benefits but I tend to believe myself that the Center's inquiry-answering service--which is the real referral part of the action--is its most important contribution to information transfer. I repeat that this service is free, open to anyone. Anyone may write or call the Center (Area code 202-426-5670) and make an inquiry. We prefer the telephone not only because it is quicker and, in the end, less expensive but especially because it affords us that precious person-to-person opportunity to "negotiate the question," to discuss the inquirer's problem, to find out what he really wants to know. This "negotiation of the question" is so important to successful information service that we seldom attempt to answer a letter inquiry without calling the inquirer on the telephone. In this way, our replies are tailored to the individual needs of the requestor according to a number of variables--who is asking the question, at what level of difficulty or sophistication he is working, the intended use of the information, and possibly many other factors.

I have said that the Center makes a real distinction between referral activities and reference activities. It happens not infrequently that "negotiation of the question" will disclose that the requestor's query can be answered bibliographically--with a citation of a book, or journal article, or technical report. If so, the requestor is immediately referred to a reference specialist right in the Science and Technology Divison. Naturally, the majority of the bibliographic inquiries inadvertently directed to the Referral Center never have to go out of the Division, let alone the Library of Congress, for reply.

I believe this state of affairs, this range of information service capabilities, is unique. A single telephone call or letter to the Referral Center will give the inquirer access to a large file of directory-type information, will lead him to a referral point of choice for the solution of his problem, or will give him access to books, journal articles, or technical reports which he may use in person if he chooses, or by means of photocopy to the item or any part of the item.

The imbedding of the National Referral Center in the Library of Congress is perhaps its greatest strength. The construction of the basic inventory is easier and more likely to be full and correct in such an information-rich environment than it could be in isolation. Whether one be a referral specialist or a reference librarian, it is not only of great professional comfort but of great benefit to the user to have the backup of more than 3 million books in science and technology, some 20,000 current journal titles, and over 1-3/4 million technical reports.

It is also of interest, I think, at this particular conference, that much of the bibliographic work of the Library's Science and Technology Division has been in areas bearing on the environment and environmental problems. The Bibliography on Snow, Ice, and Permafrost, begun in 1949 and still being compiled to this day, has always covered much research and engineering literature of environmental import. So also the Aerospace Medicine and Biology Bibliography, issued in 11 volumes between 1956 and 1966. The Air Force Scientific Research Bibliography, in 8 hefty tomes covering 20 years of research and development from the end of World War II to 1965, is another case in point. Materials Research Abstracts and the classic annotated bibliography on Marine Borers, by Clapp and Kenk, are of similar interest. The Effects of Cold on Man, Biological Effects of Magnetic Fields, and The Effects of Noise on Man were all earlier efforts in the field. Or, how about The Pharmacology and Use of Certain Drugs and Reports on Sustenance, Waste Management, and Sanitation? The Air Pollution Bibliography was begun in the Science and Technology Division which published volumes in 1957 and 1959 and thereafter for several years contributed abstracts of current literature on a monthly basis to Air Pollution Control Association (APCA) Abstracts in cooperation with the U. S. Public

Health Service. I could go on, but I believe I have cited enough titles to demonstrate that the National Referral Center came into being in an environment already highly sensitive to problems of the environment and environmental research.

I should mention another feature that characterizes the National Referral Center, as it should all good information services. That is its vital concern with feedback. Not only is each referral response cataloged and analyzed and its salient data stored in the computer; a significant sample number are followed up two months after the initial reply with a letter to the inquirer asking what results were obtained from the referral points cited and if the answer was satisfactory. The response to these letters is about 56%. Eight percent of the replies say: "You didn't help us a bit. Drop dead;" 18 percent say: "Thanks but it didn't really work out;" while 74 percent report unqualified satisfaction. So, over a period of nearly ten years, that means a lot of satisfied customers. To which I may add as a final note that today the Referral Center has only about a third the number of staff that it had five years ago while the statistics in all categories are higher than ever.

A recent innovation on the part of the National Referral Center is the compilation and issuance of what, for lack of any jazzier name, we called Selected Lists. Since the Center's register files have been put into the computer, we have had the capability of generating special listings of information resources on a selective basis and in the past several years have had many requests for "quick-and-dirty" services of this kind. These requests often came from the National Science Foundation Office of Science Information Service or from the Congressional Research Service of the Library of Congress or from one of the Federal research and development agencies of the COSATI community. Such inquiries usually took the form of: "Can you give us a quick reading as to what you've got on so-and-so?"

It was not difficult to grind out such lists but there were always problems of subject indexing, or incompleteness of the record, or duplicate entry that made us reluctant to have these lists shown around without considerable editing effort which we felt we could ill afford. (I might point out that the Center classifies its files by the COSATI categories and headings, and bases its indexing on the Thesaurus of Engineering and Scientific Terms (TEST) issued by the Department of Defense in 1967 and resulting from Project LEX of the Office of Naval Research.) In time we found that we were putting so much work into these one-shot compilations that we decided to make them publicly available. Quite a number have now been issued, and at least 8 or 10 are related to environmental problems: hazardous materials, pesticides, noise pollution, solid waste, biological effects of radiation, drug abuse and alcoholism, etc. Examples may be seen in the NRC exhibit.

The Reference Section of the Science and Technology Division issues a related series of bibliographic reference aids which are now official Library publications known as LC Science Tracer Bullets. Some topics of possible interest are: endangered species (animals), fresh-water ecology, biological effects of radiation, and mariculture (sea farming). These TB's or a fuller list of topics may be seen at the Exhibit.

The Science Information Exchange

A non-bibliographic information service which in some respects parallels the National Referral Center is the Smithsonian Science Information Exchange.

In 1949 rapidly expanding programs in medical research prompted several Government agencies to join in establishing the Medical Sciences Information Exchange. Its mission was to facilitate effective planning and management by promoting the timely exchange of information on the current research activities of

Government and non-government agencies and institutions. During the next few years related areas of biological research were added to the medical sciences and the name "Bio-Sciences Information Exchange" was adopted in 1953. At this time it came under the direction of the Smithsonian Institution. In 1960 it was renamed the Science Information Exchange to signify the addition of research information in the physical sciences.

SIE is a clearinghouse for information on current scientific research actually in progress. It differs significantly from other library, documentation and technical reference services in two respects. First, it is concerned only with research actually in progress. It does not register progress reports, abstracts, or other forms of published research results. Second, the Exchange compiles numerical and technical information for program management purposes at the request of directors and research administrators of supporting and cooperating agencies.

At first supported by a group of Federal r & d agencies, the Exchange was funded in the 1960's largely by the National Science Foundation. It is now a corporation and recovers a high percentage of its costs from a variety of service fees. Since the fee structure is a bit complicated, I will not attempt to describe it here. The Exchange, its services, and charges are explained in its brochure, a copy of which is available for examination at the NRC display booth. This brochure may be requested by writing the Smithsonian Science Information Exchange, Inc., 1730 M Street, N.W., Washington, D.C. 20036. Phone: Area Code 202 - 381-5511.

SIE annually collects 85,000 to 100,000 single-page records of current research projects, both of the government and the private sector. Each record describes WHO supports the project, WHO does it, WHERE and WHEN the research is performed, and includes a technical summary of the project. The SIE collection covers basic and applied research in the life, physical, social, behavioral, and engineering sciences. The requestor may obtain specific or general information as he desires.

Proven uses of the service include:

Obtain from one convenient source information on research programs under way, regardless of the number of agencies supporting work in the field.

Keep abreast of new research being conducted in any scientific discipline.

Avoid duplication in the planning of new research programs.

Help prepare proposals for grants or contracts.

Learn what a named investigator is presently working on.

Learn about the research activities of a specified department, research branch or research organization.

Detect trends and shifts in research interest from year to year.

Compile and update invitation lists for symposia and conferences, or identify prospective discussion leaders.

Aid in planning on-site visits by foreign scientists or dignitaries.

Compare and coordinate projects and programs among agencies with overlapping interests and missions.

Observe the distribution of projects geographically by sponsors, performers, subject fields or any combination thereof.

Help define and describe new programs of complex multidisciplinary content by tabulation of research already in progress.

Assist in finding possible sources of research support.

Obtain large volumes of scientific information in machinable form for computer-based data files.

Preparation of catalogs for publication in selected areas of ongoing research.

Who uses the service? Program administrators, research managers, professional societies, individual researchers, professional and trade journals, public officials, contract officers, non-profit organizations, scientific newsletters, scientific consultants, grant administrators, grant applicants, and information centers.

The utility of the service in the environmental field is indicated by the following list of recent search subjects: drugs and drug addiction, solid waste management, nuclear magnetic resonance (NMR) studies of metals to determine shielding effects of non-magnetic impurities, urban and regional planning, research in oral contraception, continental drift and/or sea floor spreading, airport noise and sonic boom studies, effect of pollution on primary productivity and fresh water ecosystems, stress corrosion studies, behavioral aspects of drug abuse, pesticide residues in the food chain for man, domestic animals and wildlife, radiation induced polymerization, research on field effect transistors, thermal pollution, and incineration studies.

A word to the user: SIE's services may be requested by phone or by mail. Information is provided in hard-copy or magnetic tape form. Fees are subject to change without notice.

Prospects and Problems

If we may look back in order better to look forward, the first thing that strikes me about the past decade is the proliferation of information activities, especially activities that call themselves referral services. When we set up NRC ten years ago, librarians scoffed because they had "always done it," while information people (I won't call them information scientists) figured it for just another boondoggle.

Today, an information center is just not complete unless it offers referral services. Well, Gertrude Stein once said to Hemingway, after he had written patronizingly in one of his stories that Miss Stein always knew what was good in a Cézanne painting: "Hemingway, remarks are not literature." And I will say now that lists of organizations, and people, and products, etc., etc. are not referral services.

The second most notable development is the proliferation of directories and directory services. After NRC's first directory, with its meager 1100 entries--to me a thing with little form and less content--became a big seller at GPO, I became convinced that anything with the word directory on it was salable.

So I think perhaps the next publications of NRC should be a directory of referral services and a directory of directories. We have made a start toward both, and I have brought along today a "quick-and-dirty" listing of directory-type services in the environmental field.

We are here today to talk about the prospects and problems of developing or defining and improving national information services in fields relating to the environment. Let me throw out a warning, then, against the proliferation of information services. Overpopulation in the institutional sense is just as big a menace as people overpopulation. During World War II, General George C. Marshall used to complain that too many of his overseas theater commanders suffered from the disease he called "localitis." Exaggerated parochialism is just as dangerous, just asdefeating, in the information business.

The Weinberg Report, ten years ago, stressed the complicated and confusing welter of scientific and technical information activities and predicted that relief would come through the development of markedly increased numbers of specialized information centers and of "delegated agencies" for particular subject fields. The relief has not come, yet the proliferation of information activities accelerates all the time. It is no consolation that there is also a high death-rate of such activities, which seems to indicate that the early dead had no or little viability from the beginning. In the biological sphere we would say such a situation would justify strong birth-control measures. I think this is no less true in the information sphere. When we set up inviable information activities we are robbing the taxpayer and shortchanging the user.

Relief will come, if it comes at all, through improved technology and a recognition of the economic realities. We learned, after some bitter experience, that every town in the country did not need its own telephone company nor every neighborhood its own streetcar line, and we realized that they couldn't pay their way even if they were needed.

The computer, wedded to telecommunications, plus adoption of the information utility concept, seem to be the instruments for solving the information networking problem, including the future of referral activities. At NRC we have been working out of the computer and over the telephone for some time. This is not yet real-time, on-line, remote access, but it points the way.

The information networks, including especially referral networks, to be useful in the future, must be international in scope, service, and accessibility. In 1964, I gave a paper in England, near the close of which I said: "The National Referral Center's great hope is that other countries will follow suit and establish referral centers of their own. If country after country would do so an international network of referral centers could be developed, and the scientist, the engineer, and the technical librarian would have easy, rapid access to scientific and technical information everywhere."

We have been gratified at the large number of foreign scientists, librarians, and information specialists who visit the Center every year. Several countries have indicated to us that they are planning to set up national information centers that will provide referral services modeled on those of NRC. As might be expected, the Japan Information Center for Science and Technology heads the parade. The Australians are working at it through the Commonwealth Scientific and Industrial Research Organization. In Israel it is the Center of Scientific and Technical Information. Closer to home, plans are being laid in both Canada and Mexico.

Lately, there have been stirrings on the international scene. In his message of March 16, 1972, concerning Science and Technology (H.R. Doc. 92-193), President Nixon called for a strengthening of U. S. participation in cooperative international efforts. He referred to his request to Congress to begin by creating a United Nations Fund for the Environment "to foster an international attack on environmental problems." In April 1972, a UN Conference on the Human Environment was held in Stockholm. Among many proposals, the U. S. delegation introduced a recommendation that the Secretary-General establish "an international referral service for the efficient international exchange of information on environmental problems and solutions." An array of obstacles to improved information exchange was recognized in the discussions, notably the lack of acceptable techniques for handling socio-economic information and for identifying the real needs of users, in particular of decision-makers. A modest International Referral Service for sources of environmental information was thought to be manageable in cost/benefit terms.

It is interesting that the referral concept was preferred to the concept of setting up, at this stage, a specialized service for any one specific subject area because it avoided creating a precedent that would imply future recognition of specialized needs in all other areas and sub-areas. The specialized subject-oriented information center approach was rejected on the grounds that it would be complicated, confusing, and immensely expensive.

Conversely, the referral service approach, it was agreed, offered maximum value at modest cost because it would capitalize on existing information resources and services and, through them, provide a basis for identifying whatever further mechanisms or vehicles might be necessary to satisfy specialized needs.

As we meet here in Cincinnati this week, a follow-up conference to the Stockholm conference is taking place in London where the referral proposal is to be discussed in greater depth. It looks as if we will have to have a follow-up conference to discuss those discussions.

I do not want to end this paper on a note of speculation about the future. I want to return to the U. S. National Referral Center of today.

It is said that in his big roll-top desk, bursting with jumbled papers, in his old law office in Springfield---Illinois, that is, not Virginia!---Abraham Lincoln kept a large envelope on which he had written: "If you can't find it anywhere else, look in here." That was his finding place of last resort.

Now just the opposite is true of the National Referral Center. It is designed to be a finding place of first resort. When you have an information problem, don't waste time and energy frantically scurrying hither and yon. Come to us. Let us help you find the answer. That's what you are paying your tax dollars for. You might as well get the return on them that is due you.

LC SCIENCE TRACER BULLET SERIES

TB 72-1	ACUPUNCTURE	APRIL 20, 1972
TB 72-2	SICKLE CELL ANEMIA	MAY 16, 1972
TB 72-3	ENDANGERED SPECIES (ANIMALS)	MAY 2, 1972
TB 72-4	FRESH-WATER ECOLOGY	MAY 2, 1972
TB 72-5	SCIENCE POLICY	MAY 17, 1972
TB 72-6	BIOLOGICAL EFFECTS OF RADIATION	MAY 23, 1972
TB 72-7	ROSE CULTURE	MAY 30, 1972
TB 72-8	MARS (PLANET)	JUNE 19, 1972
TB 72-9	NUCLEAR MEDICINE	JUNE 19, 1972
TB 72-10	MARICULTURE (SEA FARMING)	JUNE 30, 1972
TB 72-11	QUASARS	JULY 20, 1972
TB 72-12	CATV (Community Antenna TV)	JULY 26, 1972
TB 72-13	COMPUTER OUTPUT MICROFILM (COM)	AUGUST, 1972

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L. Clark Hamilton
Library of Congress

Legal, Legislative and Regulatory Session

Having read the outlines of the presentation of the other speakers on my panel, I concluded that it is difficult for any of us to talk about legal information without being redundant. This is true whether we are talking about data centers, legal publications or referral activities. I might add that this redundancy extends to all of the major topics of the symposium. The reason is that although the information content may vary, the methods and technologies for handling the information are similar. This is true whether you are talking about manual or automated systems. I would like to illustrate my point as follows: Mr. Marvin McFarland, a later speaker in the program, is Chief of the Science and Technology Division of the Reference Department, Library of Congress. His division and the National Referral Center which he also directs are supported by my office in the area of automated information retrieval. At the same time another of my "customers" within the Library of Congress is the Congressional Research Service which is concerned with legislative or legal information, among other subjects. In many instances I will be satisfying the requirements of both of these organizations within the Library of Congress using the same computer system or programs. Also, all of the automated information applications of all departments of the Library, with the exception of the Card Division, are run on one central computer. So, bear in mind as you listen to the presentations during the three days that while the content will vary, the techniques of classification, storage, retrieval and dissemination will be similar.

Since the major subject of this panel discussion is legal information centers, what I plan to do in the next few minutes is first, give a brief description of the development of information centers in the United States and second, describe how legal information is produced and used in the Library of Congress.

As all of you know, the volume of data produced in the basic and applied sciences grew at an unparalleled rate during and after World War II. The stimulus for this growth was initially the work carried on by the Atomic Energy Commission followed by the DOD weapons program and more recently the U. S. space program.

In order to rapidly retrieve and disseminate this material to the great number of users a number of new techniques were developed.

1. Detailed classification systems were devised to breakdown the information into manageable categories.

2. Special or "controlled" vocabularies of key words were developed to describe the contents of larger works.

3. When space became a problem, the original documents were microfilmed and key words or abstracts entries were used as the method to retrieve the microfilm.

4. As computers came into wider use, much of the descriptive or finding data about the source documents were converted to computer readable form. This, of course, greatly speeded up the process of searching and finding information.

5. Use of the computer permitted the beginning of some semi-automatic forms of selection and dissemination of information. The theory was that you should be able to use the same key-words that described the source documents to construct an interest profile of the individual consumers of the information. In this manner when new information was received, the key words which described the information, in computer readable form, are matched against all consumer interest profiles, also in computer readable form; all documents that match the profile are automatically disseminated to the user. This technique is known as selective dissemination of information or SDI.

6. Another variation introduced was to construct special combinations of key words for a single search of all records in the computer data base that match. This process has come to be known as a retrospective search.

7. Early computerized searches of data bases involved translation of the search from English language statements to computer code. To make the use of the computer as efficient as possible, several searches were grouped together and performed at one time. This is called "batch processing". The turnaround or the time between submitting the search and receiving the answer was usually several hours to several days.

8. In recent years, computer terminals have been developed which permit the user to directly interrogate the computer files using simple code instructions or English statements. The terminal can be either a typewriter or a video screen with its associated keyboard. The advantage over batch processing is that the user receives an immediate answer to his inquiry. He can make an on-the-spot determination of the number of answers received and their pertinence. If

the answers are not pertinent or too voluminois, he can then restate his inquiry or refine it. This process is termed "interactive searching".

9. In the area of microfilm, it is now possible to attach a devise to a computer which will allow the products from the computer to be converted directly to microform (film or fiche). In fact, some publications are presently being produced only on microform or in microform as a primary medium.

I would next like to tell you how the information technology that I have previously described is being applied in the Library of Congress. Prior to doing this, I must point out some organizational and functional distinctions. When one speaks of automated information activities relating to the Congress this encompasses the House of Representatives, the Senate, the Library of Congress, the Government Printing Office and the General Accounting Office. Each of these "Congressional Agencies" has its own computer, and each agency is involved to a varying degree in automating its operations. Although legislative oversight of these activities is not concentrated in any one Congressional committee, there is informal interchange of information between the managers at the working level.

Within the Library of Congress itself, information processing is divided into two major categories:

1. The activities which support the Congress directly or indirectly through the Congressional Research Service;

2. The activities which involve the processing, dissemination and retrieval of bibliographic information.

The principal user of automated legal research systems within the Library of Congress is the Congressional Research Service or CRS. In its support of the Congress, CRS is both a producer and consumer of legal information. The American Law Division of CRS publishes the Digest of Public General Bills and Resolutions* and the Legislative Status Report**. In researching legal questions submitted by members of Congress, the American Law Division and other divisions of the Congressional Research Service are consumers of legal information as in any other legal environment.

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*The Digest of Public General Bills and Resolutions provides, in the form of a summary, the essential features of public bills and resolutions and the changes made therein during the legislative process. It contains a record of committee actions, floor actions and enactments. Also included are indexes by subject, author, specific title and identical bills.

The digest is normally published during each session of a Congress in five or more cumulative issues with biweekly supplements as needed. A final edition is produced at the conclusion of each session.

** The Legislative Status Report draws together in a single source selected information contained in the Daily Digest, the Calendar of the House of Representatives and the Digest of Public General Bills. It does not replace any of these sources of information. The summaries provided in this report are arranged by general subject categories and are intended only to identify and note the basic contents of the bills.

The Bill Digest publication has figured prominently in the Library of Congress' efforts in automated legal research. In 1967 the volume of bills submitted in each session of Congress had reached such proportions that the research and publication staffs were being inundated with work. To lessen the work load, CRS, assisted by Computer Applications, installed the IBM Administrative Terminal System (ATS) for use by the Bill Digest Publication Unit. The digest information was then entered into ATS, using typewriter terminals. With the next editing and formatting capabilities of ATS, CRS personnel were able to cope more effectively with the volume of information. As a by-product of this effort, Congtessional Research Service now had a machine-readable data base of legal text.

In 1969 and 1970 the Computer Applications Office surveyed available software packages both within and outside of the government for use in the retrieval of information from this data base. In early 1971 an IBM program product, the Customer Information Control System (CICS), was selected. I would note that this is not a complete information retrieval system. CICS provides the connection between the terminals and the computer files, but each user must write his own programs to satisfy his individual requirements. Computer Applications Office personnel designed and programmed a basic on-line retrieval system for the bill digest file in early 1971. The user of the system can retrieve bills using the following parameters: bill number, sponsor, co-sponsor or single descriptor. Each bill record contains the following:

- Number
- Title
- Sponsor
- Cosponsor(s)
- Status (Congressional actions)

- Committee
- Digest (original and revised)
- Bill relationships
  - Identical bills
  - Companion bills
  - Merged bills
- Subject descriptors
- Title

If the digest is too large to fit on a single video terminal screen, the system can page forward and backward or skip to a certain page. The system is presently being used by CRS researchers to track specific bills for which they have responsibility. The file is updated overnight.

The present system provides an initial capability. The following are some of the improvements in benefits that are planned or under development.

- The ability to update the computer file on-line as changes in the status of the bill take place.
- The ability to search the file using a key word match. The bills are presently indexed with a thesaurus designated the Legislative Indexing Vocabulary (LIV).
- The ability to search the text of the digest. In this regard, the Library is investigating the capabilities of IBM's Storage and Information Retrieval System (STAIRS).

Other improvements are being made in the publications portion of this system. Originally the camera-ready copy for reproduction was produced from the same typewriter terminal used to enter the data. This provided good copy but was time consuming. In 1971 the Computer Applications Office modified the system so that the copy was printed on the high speed computer printer, which reduced the composition time by over 90%. Eventually programs will be developed that will permit the Bill Digest in machine-readable form to be entered directly into the Government Printing Office Linotron or other system for automated photocomposing.

Although some parts for the Bill Digest system were written specifically for this application, much of the on-line software is general purpose. Therefore, it is capable of being used in other applications involving both legal and non-legal information. Considering the scope of the activities of the Congress and the Library of Congress, there should be no lack of uses for this software.

In addition to legal information, the Congressional Research Service is concerned with a wide variety of other substantive information. This listing of the various substantive divisions within CRS given you some idea of the diversity of subjects that must be researched in providing support to Congress. To keep up to date in its substantive areas of responsibility, CRS is the recipient of an ever increasing volume of information. To control and classify this information so as to insure that it reached the proper recipients, an SDI (Selective Dissemination of Information) system was installed by the Computer Applications Office in 1969. Now as items as information are received in CRS, selective bibliographic information plus key words that describe the contents of that item are converted to computer readable form using typewriter terminals. The key words that describe the item are then matched by computer programs against the same key words that make up the interest profiles of the subscribers to the system. For every item of information that matches a user's profile, a bibliographic card is printed by the computer. This card is then sent to the subscriber. Since the entire file of information, some 64,000 entries, is in computer readable form, it is possible to perform retrospective searches on specific subjects, such as "environment" and "waste disposal." The results of the searches are printed by the computer in the form of special bibliographies. At present, the Congressional Research Service's SDI system has over 300 subscribers.

Work is presently in progress to make this file accessible using video and typewriter terminals. In fact, the same terminals which are used to interrogate the Bill Digest file will also be used to interrogate the SDI file.

Samples of the publications and other materials that I have described will be available for inspection at the Library of Congress exhibit.

In summary, the Library of Congress has made significant progress in the application of computer and other technology in satisfying its information processing needs. Our pace has been more deliberate than some would like. However, this has probably resulted in systems that are more directly tailored to multiple Library requirements. It is also my personal opinion that many organizations are only now beginning to effectively use hardware and software technology that was developed ten years ago, Perhaps, the Library of Congress was right all along.

Thank you for your attention and consideration.

ENVIRONMENTAL LAW INFORMATION SYSTEM

by

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I. INTRODUCTION

My objective today will be to conceptualize for you an environmental law information center which would include legal, legislative and regulatory information. Part of the data base and many of the services I will describe have already been developed by commercial organizations such as my company, Aspen Systems Corporation, which specializes in legislative information for all fifty states plus the federal government; and Mead Data Central, Inc., which has developed case law data bases in New York and Ohio and one on federal tax law. There does not exist, however, any computer based information center dealing solely with environmental legal, legislative and regulatory data. I will be postulating such a specialized center in terms of what data bases it would contain, what information products and services would be provided, who the users would be and generally how the system would work. I will also attempt to demonstrate the utility, feasibility and cost effectiveness of the information center in terms of established needs and the existence of many components of the data base and technology.

As an information system designer, I rarely get the opportunity to meet with nearly a thousand potential users of an information service before it has been established. You can provide great benefit to those of us who design and implement data bases and information services by telling us what your real needs are and by reacting to the proposed product and service concepts. Your inputs will help those of us in the information industry to more quickly fashion and produce information products and services that meet your actual requirements, at a cost you can afford.

WHY LEGAL AND LEGISLATIVE INFORMATION IS IMPORTANT

The economic impact of environmental standards will be far too great to expect voluntary compliance from all of those concerned. Consequently, we will see a rapidly increasing volume of litigation and new legislation at every level of government--from the county pollution control agency to the Environmental Protection Agency, the Congress, the White House and the Supreme Court.

Environmental laws and regulations impinge on nearly every activity we engage in--the air we breathe, the water we drink and utilize for recreational purposes, the power we need to propel our automobiles and operate our factories, the food we eat, the highways and railways which cover our landscape, and our parks, forests, streams, lakes, beaches, oceans and other property in the public domain. When a company closes down a plant because it cannot afford to meet a newly imposed environmental quality standard, there are potential legal repercussions from the stockholders and bondholders, from the labor unions and employees involved, and from the community itself. All of these parties have a vested interest in environmental law.

The cost of pollution control equipment will ultimately be passed through to the consumer in the form of higher prices of goods and services. Since this is in conflict with the anti-inflation objectives of the administration, there will also be substantial interest in environmental law from many agencies of the federal and state governments, that would not normally be expected to be involved in this area.

A national company must concern itself with legislation and regulations by several agencies within the federal government, the fifty states, regional pollution control agencies, counties, cities and possibly even with international treaties. It faces legal action not only by these government entities directly, but by private citizens and citizen interest groups, individually, in class actions, or under the so-called public trust doctrine. If such a company wants to build a new plant, it has a lot to consider and much red tape to overcome, just in the environmental field alone.

WHAT IS THE PROBLEM IN SEARCHING OR KEEPING TRACK OF ENVIRONMENTAL LAW?

To begin with, there is no clear cut body of environmental law. There is no single place to look or to buy copies of all there is to know about environmental law. We must begin with all of the statutes and regulations of the states, counties, municipalities and the federal government as well as all of the reported decisions which together make up our common law system.

There are over 1-1/2 million statutes on the books of the 50 states and 2-1/2 million reported decisions. Each of these files is growing at a rate of about 25,000 per year.

Since nobody can keep up with this volume by reading everything, we must look to indexes, classification schemes, digesting services and other means to aid in retrieval.

Those of you who have occasion to use the existing manually indexed statute publications and digests of reported decisions probably realize the difficulty in using them for searching out a particular environmental problem. Since the law in this field is just now developing, the concepts which are likely to be important to you in the future were probably not thought to be important at the time this material was indexed. Hence, many cases and statutes may be difficult if not impossible to find through traditional manual searching of published indexes. In the case of statutes, there are typically articles or chapters bringing together all of the laws on a particular subject. Examples are the Education Code, the Criminal Code and the Health Code. Unfortunately, in the environmental field, the laws are scattered throughout the statute books, which increases the difficulty of access, and makes it necessary to have the entire set of books which is typically 15 volumes per state.

With computerized information retrieval, and particularly the full text natural language approach pioneered by the Health Law Center at the University of Pittsburgh in 1959, (now part of Aspen Systems Corporation), these deficiencies in indexing and codification are easily overcome.

Under the Aspen full text search approach, every word or phrase contained in the text of the statute or case can be used as a search inquiry statement either singly or in combination. The power of such a tool is illustrated by the problem which faced all state legislatures in the past few years involving minor children. Approximately 20 of our state legislative clients asked us to run a search to identify all statutes in their respective state which contained the words "21 year" or "minor". With the change in voting age, it became necessary to consider whether the definition of minor should be changed as applied to each individual law. As you can imagine, the search turned up thousands of valid references in each state. Such a search costs about $200., takes less than a minute of computer (CPU) time and perhaps 15-20 minutes to print out the full text of all statutes satisfying the search query. A manual index search would have taken several man weeks and only turned up about 60% of the references, since the concept of "minor" would have been relatively insignificant to many of the laws at the time they were enacted. To accomplish a result with the same thoroughness as the Aspen full text search would have taken several man years of manual effort to examine every page of every statute in one state and you can be sure that a few items would be missed.

Before going into further detail, let me show you what a computer search of state statutes actually looks like. Fig. 1 is a portion of a search run by Aspen for EPA on the Maryland statute data base. Looking at LIST15 we are trying to identify all statutes dealing with junkyards, rubbish and trash collection, land fill incinerators and littering generally. The (R) you see after such words as junk(R) tells the computer that it will accept any word which has these letters as a root.

Looking down you see "words added to SEARCH JUNK JUNKED JUNKYARD JUNKYARDS," etc. These are words which were picked up from the file itself based on the root word expansion feature. Note that the word RUBBLE is listed as an "invalid search term" since it did not appear even once in the entire Maryalnd Statute file.

Turning to Fig. 2 we begin to look at some of the search output. This is a statute which provides definitions of a number of terms including JUNK, JUNKYARD, etc. Note that the words contained in the search are highlighted by putting them in caps both in the text and in the margin. Since the full search dealt with a broader question, you will see other words highlighted that were not part of the particular subsearch illustrated here. Fig. 3,4,5 and 6 are all examples of statute printouts that are directly relevant to the search query. Fig. 7 is an example of a search output that is not relevant but contains the word SALVAGE and hence was pulled by the search.

II. THE DATA BASE

At this point I would like to go into a little more detail on what the data base of the environmental law center would contain and in what form it should be stored. Fig. 8 illustrates the wide range of legal materials which will make up the data base.

Statutes

At the top, we see all of the existing international, federal, state, regional and local laws. Of the 1-1/2 million statutes on the books, at least 25,000 relate to the environment. If we add in federal, regional and local laws plus those state statutes which are of only indirect relevance to environmental problems, the file might build up to 100,000 laws. If these were in full text form, this would represent a file of approximately 200,000,000 characters. Such a file could be stored on five of the new IBM 3330 disc packs.

Current Legislation

It is generally impractical to attempt to update a statute file in between legislative sessions which may be held annually or bi-annually. It is necessary, therefore, to provide for retrieval and dissemination of new laws passed during the current legislative sessions. As indicated earlier, there are approximately 25,000 new laws enacted each year, of which 500 to 1500 will have some impact on environmental problems. This file could either be stored as full text or, as Aspen has done in past years, the new laws abstracted and stored in text form. As we will see in a few moments, this can be used to prepare specialized abstract and index publications and alerting services.

Pending Legislation

There are probably some 150,000 proposed bills introduced in the various state legislatures and federal government annually. Pending legislation is of significantly more interest to large companies and citizen interest groups that are concerned with affecting the outcome of proposed legislation. There are bill digesting services in nearly every state which produce daily or weekly printed or mimeographed abstract reports of all bills introduced in a given state. The information center would make arrangements to obtain copies of all proposed or introduced bills relating to the environment and would store abstracts of the bills in the data base. The same thing would be done with pending regulations. An estimated 3-5000 bills would be relevant.

Pending Litigation and Rulings

Since the field of environmental law is in its infancy, the arguments and testimony in cases now pending may be as significant if not more significant than those found in reported decisions over the years. The complaint, the answer, motions by either party and the briefs, which are written legal arguments, will provide interested parties with all of the current theories upon which cases can be brought or defended. Another potentially valuable data base will consist of the transcripts of testimony associated with major litigation in the environmental field. This information, when organized into a computerized data base, can provide companies and agencies with an interpretation of how the laws and regulations are actually being applied in practice. Aspen currently provides a computer based information management service for litigation files; in fact one of its major clients is involved in a large environmental case.

Case Law

The reported decisions affecting the environment will ultimately represent the largest data base. Since the field has only recently become active, there are only a relatively few cases. However, a case is generally much more voluminous than a statute and hence we would be talking of an initial data base of over 200,000,000 characters which will grow in a few years to over a billion characters. My suggestion would be to initialize the case law data base by providing detailed abstracts or extracts of each case in machine readable form. As the commercial case law data base services evolve, full text copies of the relevant portions of these data bases could be acquired. Computer storage costs will have dropped substantially in a few years as well.

Regulations

The federal, state and local regulations probably represent the most important segment of the environmental law data base. The regulations of state agencies are generally not nearly as well organized and disseminated as state statutes. The situation for municipal governments is more difficult, probably by an order of magnitude. Hence, an important service of the information center is simply to collect and make accessible all regulatory materials concerning the environment.

By nature, regulatory materials are detailed and will get down into quantitative measures in terms of standards, tolerances and the like. It is very difficult to index such materials since one page may contain 50 items of probable releavance to different parties. Hence, it would appear that the most effective method of storage will be in natural language full text form. Because the state and local regulations are still in the process of being promulgated, I frankly have no feel for the volume of data. My guess is that we are talking about a file of several times the volume of those statutes directly related to the environment. If I had to put a number on it I would say that the file size would be about 100 million characters, if we limit the regulations to those having a direct impact. On the other hand, if we included regulations of indirect importance, the file would probably go to 300 million characters.

Administrative Rulings/Attorney General's Opinions

Most of the compliance activity will take place within the administrative process at all levels of government. Hence an important body of law will be the administrative decisions of the pollution control agencies and in some cases the Attorney General's Opinions of the state. This body of law is typically one that is very difficult to gain access to. Hence it is a most appropriate function for the information center to address. Again, its major contribution will be to pull together information of this type. Again, there is really no basis for estimating the volume of this material. If it becomes too great, we might consider abstracting it and storing the abstracts in text form. If I had to hazard a guess on the size of a text file, I would say it would be at least comparable to the reported decision file which should represent over a billion characters within several years.

Form of Storage

As I have indicated all along, the most effective form of storage for detailed access would be natural language text in machine readable form. As you might suspect, it is quite expensive to convert a billion characters of text into machine readable form. It is also relatively expensive to store files of this size for on-line computer searching. If there are enough users and inquiries to justify keeping the file on-line, then the storage costs will become insignificant. It is further not clear that all portions of the data base need to be stored on-line, which means they would be accessible to a remote typewriter or display terminal in the user's office. If the file is not stored on-line, the storage costs become relatively minor.

The decision as to whether to store full text in machine readable form, abstracts in machine readable form or manually assigned index terms will depend upon a detailed systems analysis and design study. The factors which will determine, however, are:

A) the existence of machine readable text
B) the need for on-line storage
C) the volume of text
D) the types of searches and other uses contemplated
E) the volume of requests
F) the availability of manual indexes
G) the speed of response required
H) technological developments in storage and input methods

III. EXISTING SOURCES OF INFORMATION

More than two billion characters worth of legal and legislative information have already been committed to machine readable form. Aspen Systems Corporation has converted state and federal statutes, decisions of the U.S. Supreme Court, Circuit Courts of Appeal, and Pennsylvania Supreme and Appellate Courts; and a small portion of municipal ordinances, Attorney General's Opinions and Regulations. Mead Data Central has converted the case law of Ohio and New York and has created a federal tax data base. The Air Force under the LITE (Legal Information Through Electronics) Project has created a data base of the Comptroller General's Decisions, U.S. Code and a few smaller data bases. A number of state legislatures are operating internal systems which utilize a full text data base of their statutes. Many of them are operating computerized bill status systems which can provide information on pending legislation. Some of the state courts are beginning to utilize computerized typesetting which will provide a by-product machine readable data base.

IV. INFORMATION PRODUCTS AND SERVICES

At this point I would like to describe for you some of the types of services that could be provided by an information center with the data base already described.

Retrospective Searching

The first product, of course, would be the ability to search the data base for any particular problem. I have already showed you an example of search output (Fig. 3). Fig. 9 illustrates a typical search request.

Selective Dissemination of Information

Another type of service known in the industry as SDI or Selective Dissemination of Information provides an alerting function. This would be used to keep users apprised of new pending legislation, recent enactments, major decisions, proposed regulations or new rulings according to prestored request profiles. For example, an oil company might be interested in any legal developments affecting oil spills. The Sierra Club might wish to be automatically alerted to any new regulations affecting land use. Fig. 10 illustrates an SDI printout utilizing Aspen's abstract data base of recently enacted legislation.

Published Compilations

As I indicated earlier, one of the most valuable functions of the information center will be to pull together all of the information relevant to environmental law. Once having done this and converted it into machine processable form, it will be possible to produce specialized publications such as a compilation of all laws on a given subject. Figs. 11 and 12 illustrate a special compilation of the water laws in the State of Idaho prepared for the State itself. This was accomplished by first producing a search of the data base to identify all of these laws, many of which were scattered throughout all volumes of the Idaho Statutes. The search results were kept on magnetic tape and after reviewing and editing were used to computer photocompose a special publication which was distributed to all those concerned with water laws in the State of Idaho. You will note in Fig. 12 that in addition to typesetting the statutes themselves, we provided a published index to the compilation using an Aspen proprietary automatic indexing system known as AUTO-INDEX.

Legal Guides for Selected Industries

Just as we can produce a compilation of statutes, regulations, etc., for a given subject such as water laws, air pollution, etc., the center could produce special compilations for different industries, e.g., steel, petroleum, airlines, etc.

Model Laws

The information center might also provide the function of drafting model legislation. It would certainly be in a very good position to evaluate the laws of the fifty states and all municipalities and regional agencies. It is assumed that the center would be staffed with attorneys with experience in environmental law and legislative drafting.

Legislative Bill Drafting

The center could also provide assistance to state and local legislatures in drafting specific legislation and/or regulations. Along these lines, the data base could be used in conjunction with a legislative bill drafting or text editing system, which is becoming more prevalent in state legislatures in particular. Using a system such as the Aspen Qwik-Draft system, an existing statute can be called up to the face of a display terminal with a television-like screen. Using the keyboard, the suggested changes or additions can be keyed directly on the screen as illustrated in Fig. 13. With the press of a single button, the computer system will print out the revised text of the proposed new statute or regulation.

Published Indexes and Digests

The services of an information center generally obtain mass distribution through published products. One type of product will be a cumulative index to the collection of statutes, rules, regulations, etc. If abstracts are also prepared and published, the indexing can be done automatically and would result in a printed digest and index similar to Fig. 14. Alternatively, the index might be done in the classical hierarchical editorial index fashion as we recently completed for the State of Michigan (Fig. 15). In both cases computer programs were used to aid in the assembly of the final index.

Special Federal Subfile Data Bases

The center would also be in a position to repackage a variety of data bases on specific topics or for specific industries for inclusion in internal corporate information systems, by industry associations or with government agencies. This is becoming a common practice in the information industry. Tapes are sold by Engineering Index, Chemical Abstracts Service, American Institute of Physics, ERIC and others.

V. TECHNOLOGY AND NETWORK OPERATIONS

The technology exists today to implement the system I have described. The computer hardware has reached a stage of cost/effectiveness wherein the operating costs of the computer aspects of the system should not be a major problem. A key issue is whether the services should be provided to users in an on-line interactive mode. This requires that the data base be stored on mass random access storage equipment, typically disc files and that all of the programs be resident in the computer at all times in order to service any remote terminal that may enter a request at any moment. The storage costs for a file of approximately 2 billion characters would range in the area of $30,000 per month. The computer costs for supporting an on-line application of this nature would add another $20-30,000 per month, assuming a minimum of 20 terminals. In addition, the on-line system will involve communication costs for transmitting the data back to the user. Since we are talking about full text, the lines will be utilized for a half hour to an hour for any given query. Conversely, if the search portion of the service were to utilize batch processing techniques, wherein all inquiries would be referred to the center and the results mailed back to the user, the operating costs would be in the range of $25 to $30 per full text search and the fixed costs would probably be under $10,000 per month for computer hardware.

Searching is only one of the many services which would be provided by the center. Most of the others including the specialized compilations, the SDI service and specialized indexes can be operated in a batch processing mode and do not necessarily require a dedicated computer. I am a strong advocate of on-line interactive search systems since they put the user in direct communication with the data base. Whether the cost of such a system is justified will depend solely on how much use will be made of the system.

VI. SUMMARY

The system I have described represents an ambitious undertaking. Its feasibility, however, is clearly demonstrated by the existence of such enterprises as Aspen Systems and Mead Data Central. Some of the services I have described are available commercially from these two companies. For example, Aspen can currently provide searches of existing statutes in many states, can provide tracking of recently enacted and pending legislation and can provide specialized subfiles in machine readable form on such topics as air pollution, water pollution or any other subject which may be of interest to a governmental, private or commercial organization that wishes to operate its own internal information system. If there are a number of organizations with significant interest in a data base on environmental law, Aspen and other members of the information industry could begin to pull together the system I have described today even without government funding or passage of H.R.56.

Now that I have described for you the services which exist today and the comprehensive data bank which could be established tomorrow, it is up to you the users to tell us what your real needs are and whether the proposed system would satisfy them.

I thank you for your attention.

```
         PRINT.
LIST15   GARBAGE,OFFAL,RUBBISH,TRASH,JUNK(R),DUMP(R),RUBBLE,LANDFILL,.
         PUTRESCIBLE,NONPUTRESCIBLE,ASH,ASHES,INCINERATOR(R),SALVAG(R),.
         LITTER(R).
****WORDS ADDED TO SEARCH: JUNK
                           JUNKED
                           JUNKYARD
                           JUNKYARDS
                           DUMP
                           DUMPED
                           DUMPING
                           DUMPS
***** RUBBLE INVALID SEARCH TERM
                           INCINERATOR
                           INCINERATORS
                           SALVAGE
                           SALVAGING
                           LITTER
                           LITTEPING
         PRINT.
LIST16   WASTE,WASTES,EFFLUV(R),EFFLUEN(R),RUN-OFF.
****WORDS ADDED TO SEARCH: EFFLUVIA
                           EFFLUENT
LIST17   INDUSTR(R),HOUSEHOLD,COMMERCIAL,AGRICULTUR(R),HUMAN,MINE,MINES,.
         ANIMAL,ANIMALS,SOLID,SEMISOLID,SEMI-SOLID,MUNICIPAL,UTILITY,TRANSPORT.
****WORDS ADDED TO SEARCH: INDUSTRIAL
                           INDUSTRIALIZATION
                           INDUSTRIALIZED
                           INDUSTRIALLY
                           INDUSTRIES
                           INDUSTRY
                           AGRICULTURAL
                           AGRICULTURE
***** SEMISOLID INVALID SEARCH TEPM
***** SEMI-SOLID INVALID SEARCH TERM
LIST18   TRANSPORTATION,DEMOLITION,EXPLOSIVE,SLAUGHTER(R),NONBIODEGRAD(R),.
         NON-BIODEGRAD(R),CONSTRUCTION,COMBUSTIBLE,NONCOMBUSTIBLE,.
         NON-COMBUSTIBLE,MARKET,PRODUCE,FOOD,PATHOLOGICAL.
****WORDS ADDED TO SEARCH: SLAUGHTER
                           SLAUGHTERED
                           SLAUGHTERER
                           SLAUGHTERHOUSE
                           SLAUGHTERHOUSES
                           SLAUGHTERING
                           SLAUGHTERS
```

FIGURE 1.
Search Frame

FIGURE 2.
Search Result

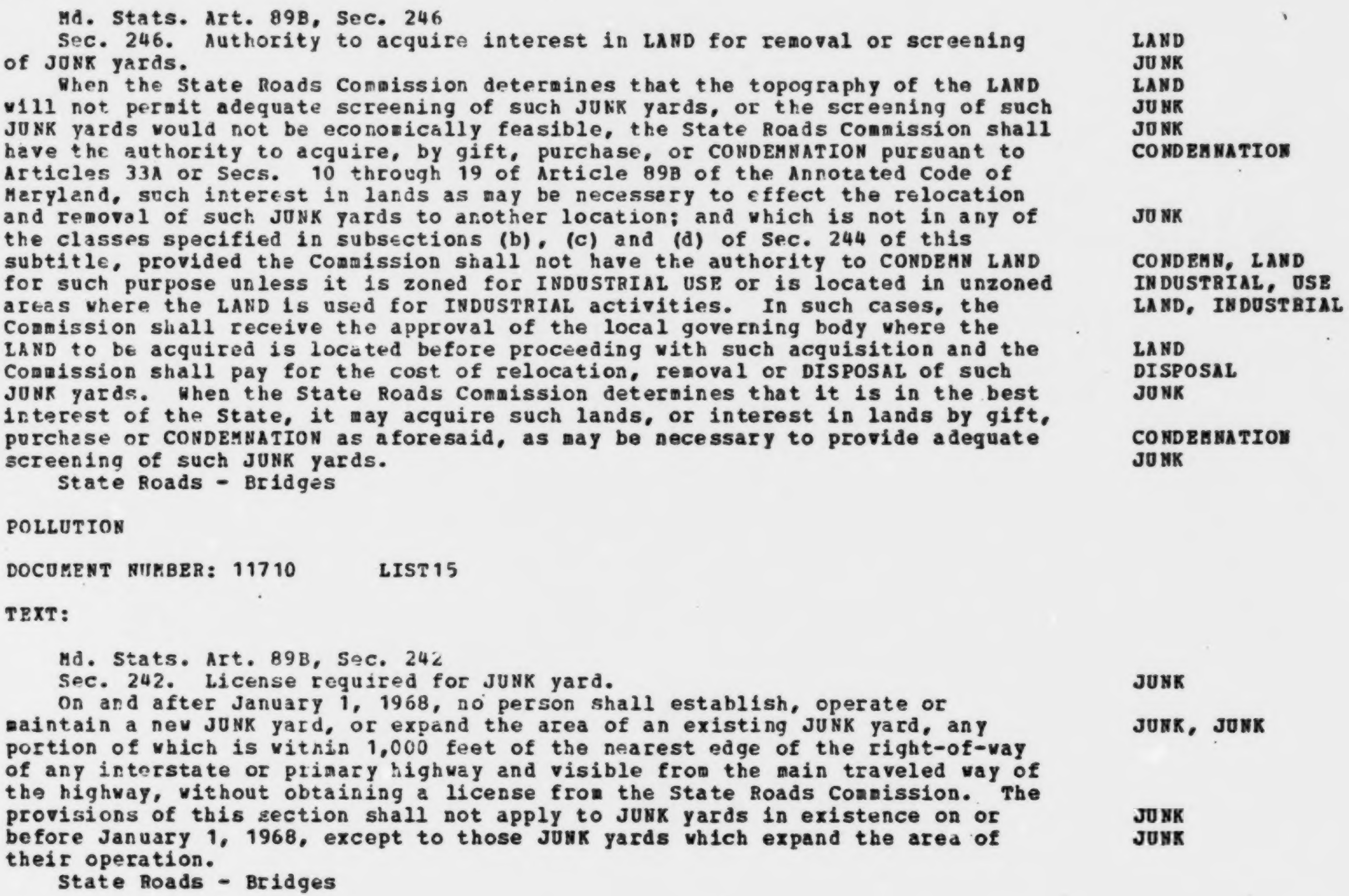
```
POLLUTION

DOCUMENT NUMBER: 11708      LIST15

TEXT:

     Md. Stats. Art. 89B, Sec. 240
     Sec. 240.  Definitions.
     (a)  JUNK.  The term  JUNK  shall mean old or scrap copper, brass, rope,     JUNK, JUNK
rags, batteries, paper, TRASH, rubber, debris, WASTE, iron, steel, and other      TRASH, WASTE
old or scrap ferrous or nonferrous material, including JUNKED, dismantled, or     JUNKED
wrecked AUTOMOBILES, or parts thereof.                                            AUTOMOBILES
     (b)  AUTOMOBILE graveyard.  The term  AUTOMOBILE graveyard  shall mean an    AUTOMOBILE, AUTOMOBILE
establishment or place of business which is maintained, used, or operated for
storing, keeping, buying or selling wrecked, scrapped, ruined, or dismantled
motor vehicles or motor vehicle parts.
     (c)  JUNK yard.  The term  JUNK yard  shall mean an establishment or place   JUNK, JUNK
or business which is maintained, operated, or used for storing, keeping, buying
or selling JUNK, or for the maintenance or operation of an AUTOMOBILE             JUNK, AUTOMOBILE
graveyard, and the term shall include GARBAGE DUMPS and sanitary fills.           GARBAGE, DUMPS
     (d)  Scrap metal processing facility.   Scrap metal processing facility
shall mean an establishment having facilities for processing iron, steel or
nonferrous scrap metal and whose principal product is scrap iron, steel or
nonferrous scrap for sale for remelting purposes only.
     (e)  Interstate system.   Interstate system  means that portion of the
national system of interstate and defense highways located within this State,
as officially designated, or as may be so designated hereafter, by the State
Roads Commission, and approved by the Secretary of Commerce or TRANSPORTATION,    TRANSPORTATION
pursuant to the provisions of Title 23, Unites States Code,  Highways.
     (f)  Primary system.   Primary system  means that portion of connected main
highways, as officially designated, or as may be hereafter so designated, by
the State Roads Commission in accordance with Sec. 7B of this article, and
approved by the Secretary of Commerce or TRANSPORTATION, pursuant to the          TRANSPORTATION
provisions of Title 23, United States Code,  Highways.
     State Roads - Bridges
```

FIGURE 3.
Search Result

```
POLLUTION

DOCUMENT NUBBER: 11715      LIST15

TEXT:

    Md. Stats. Art. 89B, Sec. 247
    Sec. 247.  Violations.
    (a)  Injunction.  The State Roads Commission may apply to the Circuit Court
of Baltimore City or the circuit court of the county in which any nonconforming
JUNK yard may be located for an injunction for violation fo this subheading.        JUNK
    (b)  Penalties; continuing violations.  Any violation of the rules and
regulations promulgated by the State Roads Commission, including the
establishment, maintenance, or operation of a JUNK yard without a license, is a     JUNK
misdemeanor, punishable upon conviction thereof by a fine of not less than $25,
nor more than $100, and, in default of the payment thereof, shall undergo
imprisonment for not more than thirty days.  Whenever the State Roads
Commission has given written notice that a JUNK yard is maintained or used in       JUNK
violation of this subheading, each day of such maintenance or USE beginning         USE
with the thirty-first day following receipt of notice shall constitute a
separate offense.
    State Roads - Bridges


POLLUTION

DOCUMENT NUMBER: 11716      LIST15

TEXT:

    Md. Stats. Art. 89B, Sec. 248
    Sec. 248.  Authority to make expenditures in excess of fees collected.
    The State Roads Commission is authorized to expend from its CONSTRUCTION        CONSTRUCTION
Fund such money in excess of that collected from license fees as is necessary
for matching federal funds to accomplish the purposes of this subheading.
Provided, however, such funds shall not be expended to pay the cost of
screening or relocating any JUNK yard when appropriate matching federal funds       JUNK
are not available therefor under the  Highway Beautification Act of 1965.
    State Roads - Bridges
```

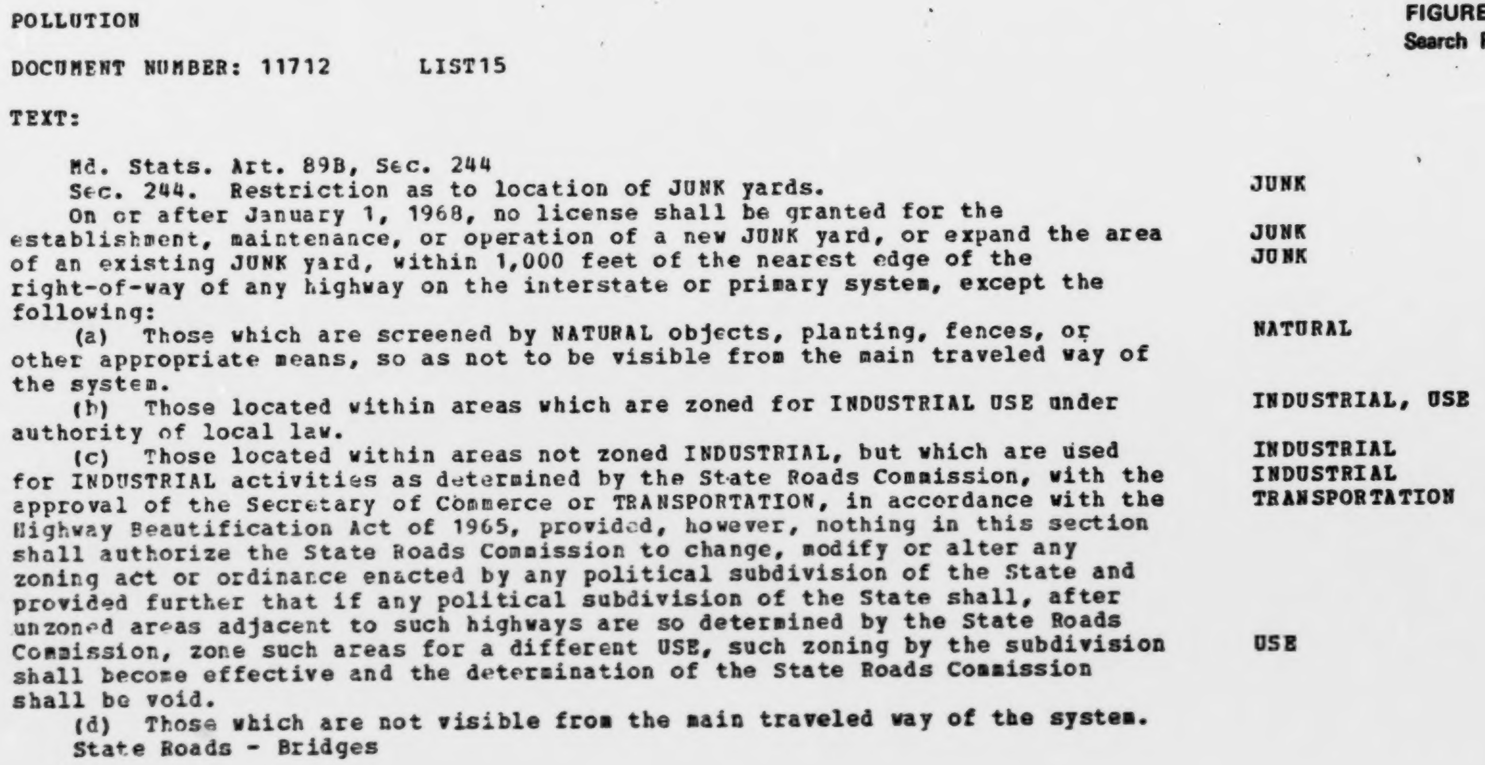
```
POLLUTION

DOCUMENT NUMBER: 11707      LIST15

TEXT:

    Md. Stats. Art. 89B, Sec. 239
    Sec. 239.  Legislative declaration.
    The General Assembly of Maryland for the purpose of promoting the public
safety, health, welfare, convenience, and enjoyment of public travel, to
protect the public investments in highways and to preserve and enhance the
scenic beauty of lands bordering public highways, hereby declares it to be in
the public interest to regulate and restrict the establishment, operation, and
maintenance of JUNK yards in areas adjacent to the interstate and primary          JUNK
systems within this State.  The General Assembly hereby finds and declares that
JUNK yards are to conform to the requirements of this subheading.                  JUNK
    State Roads - Bridges


POLLUTION

DOCUMENT NUMBER: 11717      LIST15

TEXT:

    Md. Stats. Art. 89B, Sec. 249
    Sec. 249.  Interpretation; severability;  JUNK yard  to include  scrap         JUNK
metal processing facility.
    (a)  Nothing in this subheading shall be construed to abrogate or affect
the provisions of any lawful statute, ordinance  regulation, and resolution
which is more restrictive than the provisions of this subheading.
    (b)  If any clause, section, or provision of this subheading shall be held
unconstitutional or invalid, such determination shall not be held to affect any
other clause, section, or provision hereof.
    (c)  For the purpose of this subtitle where the term  JUNK yard  is used it    JUNK
shall be deemed to include  scrap metal processing facility.
    State Roads
```

FIGURE 4.
Search Result



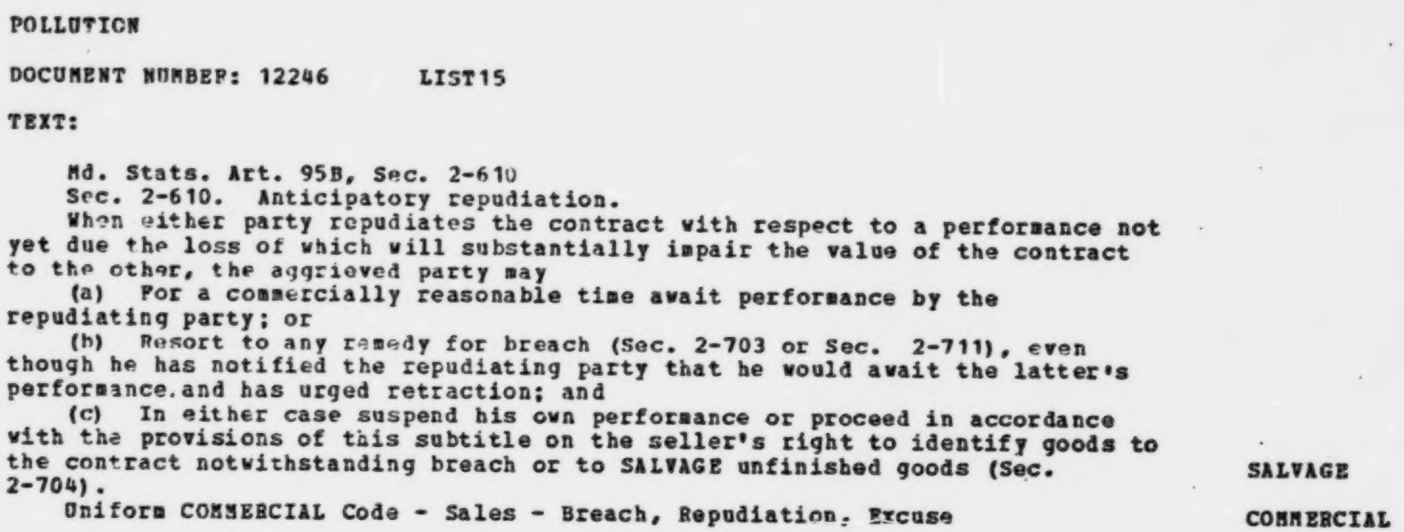
```
POLLUTION

DOCUMENT NUMBER: 11714      LIST15

TEXT:

    Md. Stats. Art. 89B, Sec. 246
    Sec. 246.  Authority to acquire interest in LAND for removal or screening        LAND
of JUNK yards.                                                                       JUNK
    When the State Roads Commission determines that the topography of the LAND       LAND
will not permit adequate screening of such JUNK yards, or the screening of such      JUNK
JUNK yards would not be economically feasible, the State Roads Commission shall      JUNK
have the authority to acquire, by gift, purchase, or CONDEMNATION pursuant to        CONDEMNATION
Articles 33A or Secs.  10 through 19 of Article 89B of the Annotated Code of
Maryland, such interest in lands as may be necessery to effect the relocation
and removal of such JUNK yards to another location; and which is not in any of       JUNK
the classes specified in subsections (b), (c) and (d) of Sec. 244 of this
subtitle, provided the Commission shall not have the authority to CONDEMN LAND       CONDEMN, LAND
for such purpose unless it is zoned for INDUSTRIAL USE or is located in unzoned      INDUSTRIAL, USE
areas where the LAND is used for INDUSTRIAL activities.  In such cases, the          LAND, INDUSTRIAL
Commission shall receive the approval of the local governing body where the
LAND to be acquired is located before proceeding with such acquisition and the       LAND
Commission shall pay for the cost of relocation, removal or DISPOSAL of such         DISPOSAL
JUNK yards.  When the State Roads Commission determines that it is in the best       JUNK
interest of the State, it may acquire such lands, or interest in lands by gift,
purchase or CONDEMNATION as aforesaid, as may be necessary to provide adequate       CONDEMNATION
screening of such JUNK yards.                                                        JUNK
    State Roads - Bridges

POLLUTION

DOCUMENT NUMBER: 11710      LIST15

TEXT:

    Md. Stats. Art. 89B, Sec. 242
    Sec. 242.  License required for JUNK yard.                                       JUNK
    On and after January 1, 1968, no person shall establish, operate or
maintain a new JUNK yard, or expand the area of an existing JUNK yard, any           JUNK, JUNK
portion of which is within 1,000 feet of the nearest edge of the right-of-way
of any interstate or primary highway and visible from the main traveled way of
the highway, without obtaining a license from the State Roads Commission.  The
provisions of this section shall not apply to JUNK yards in existence on or          JUNK
before January 1, 1968, except to those JUNK yards which expand the area of          JUNK
their operation.
    State Roads - Bridges
```

FIGURE 5.
Search Result



```
POLLUTION

DOCUMENT NUMBER: 11712      LIST15

TEXT:

    Md. Stats. Art. 89B, Sec. 244
    Sec. 244.  Restriction as to location of JUNK yards.              JUNK
    On or after January 1, 1968, no license shall be granted for the
establishment, maintenance, or operation of a new JUNK yard, or expand the area   JUNK
of an existing JUNK yard, within 1,000 feet of the nearest edge of the            JUNK
right-of-way of any highway on the interstate or primary system, except the
following:
    (a)  Those which are screened by NATURAL objects, planting, fences, or       NATURAL
other appropriate means, so as not to be visible from the main traveled way of
the system.
    (b)  Those located within areas which are zoned for INDUSTRIAL USE under     INDUSTRIAL, USE
authority of local law.
    (c)  Those located within areas not zoned INDUSTRIAL, but which are used     INDUSTRIAL
for INDUSTRIAL activities as determined by the State Roads Commission, with the   INDUSTRIAL
approval of the Secretary of Commerce or TRANSPORTATION, in accordance with the   TRANSPORTATION
Highway Beautification Act of 1965, provided, however, nothing in this section
shall authorize the State Roads Commission to change, modify or alter any
zoning act or ordinance enacted by any political subdivision of the State and
provided further that if any political subdivision of the State shall, after
unzoned areas adjacent to such highways are so determined by the State Roads
Commission, zone such areas for a different USE, such zoning by the subdivision   USE
shall become effective and the determination of the State Roads Commission
shall be void.
    (d)  Those which are not visible from the main traveled way of the system.
    State Roads - Bridges
```

FIGURE 6.
Search Result



```
POLLUTION

DOCUMENT NUMBER: 12246      LIST15

TEXT:

    Md. Stats. Art. 95B, Sec. 2-610
    Sec. 2-610.  Anticipatory repudiation.
    When either party repudiates the contract with respect to a performance not
yet due the loss of which will substantially impair the value of the contract
to the other, the aggrieved party may
    (a)  For a commercially reasonable time await performance by the
repudiating party; or
    (b)  Resort to any remedy for breach (Sec. 2-703 or Sec.  2-711), even
though he has notified the repudiating party that he would await the latter's
performance.and has urged retraction; and
    (c)  In either case suspend his own performance or proceed in accordance
with the provisions of this subtitle on the seller's right to identify goods to
the contract notwithstanding breach or to SALVAGE unfinished goods (Sec.          SALVAGE
2-704).
    Uniform COMMERCIAL Code - Sales - Breach, Repudiation, Excuse                 COMMERCIAL
```

FIGURE 7.
Search Result
(Not Relevant)

FIGURE 8.
THE DATA BASE

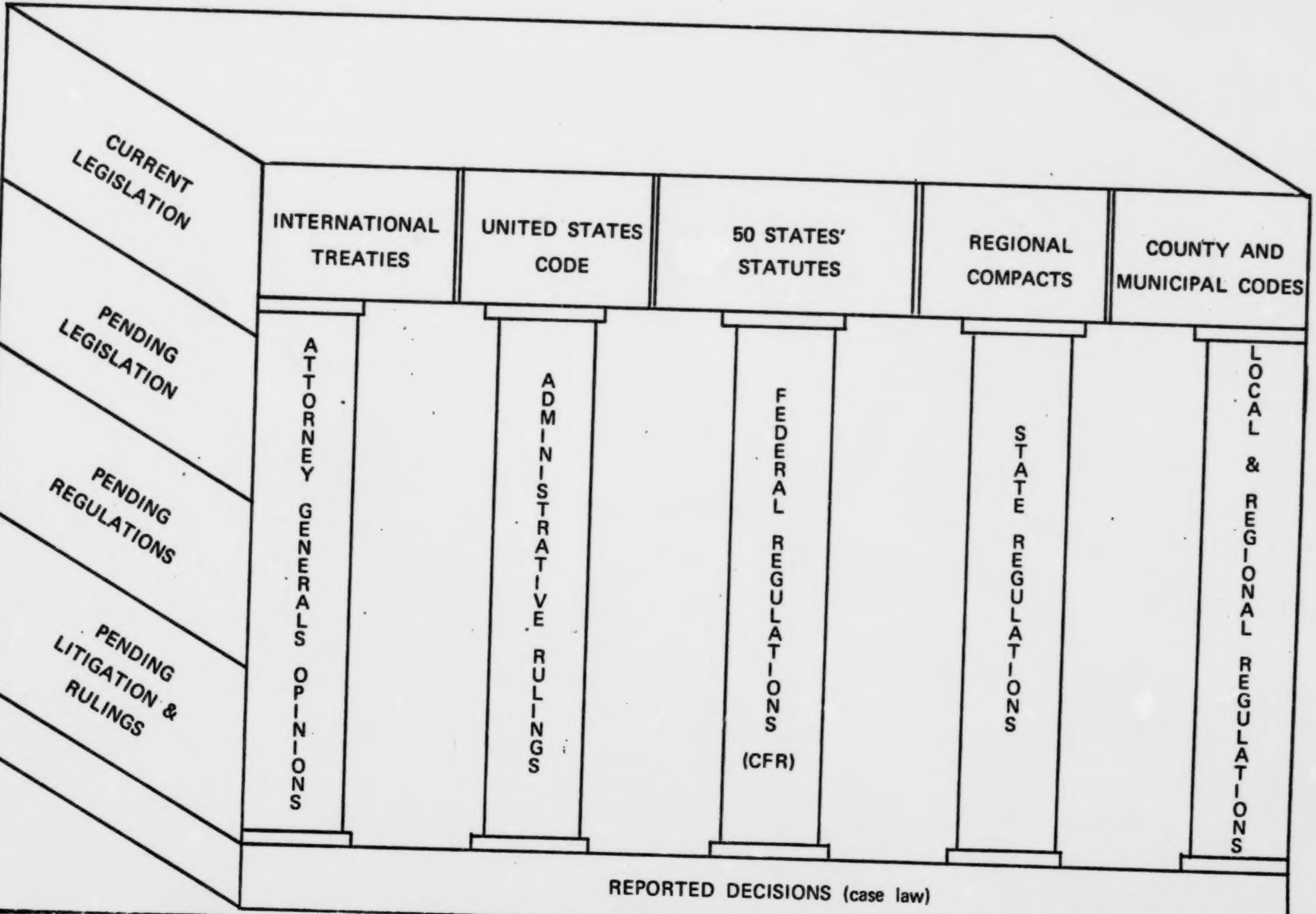
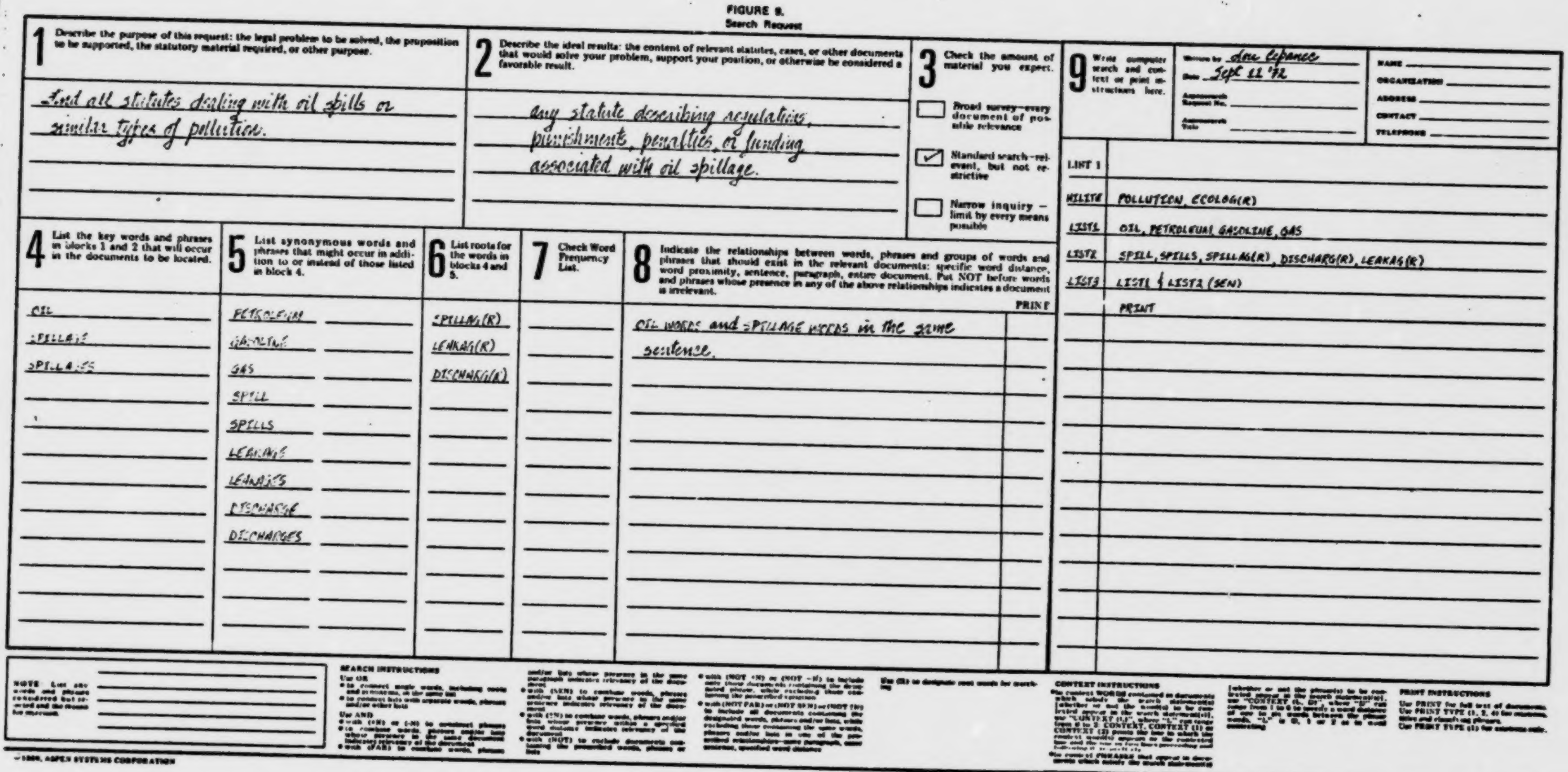


FIGURE 8.
Search Request



1 Describe the purpose of this request: the legal problem to be solved, the proposition to be supported, the statutory material required, or other purpose.

Find all statutes dealing with oil spills or similar types of pollution.

2 Describe the ideal results: the content of relevant statutes, cases, or other documents that would solve your problem, support your position, or otherwise be considered a favorable result.

any statute describing regulations, punishments, penalties, or funding associated with oil spillage.

3 Check the amount of material you expect.

☐ Broad survey—every document of possible relevance
☑ Standard search—relevant, but not restrictive
☐ Narrow inquiry—limit by every means possible

4 List the key words and phrases in blocks 1 and 2 that will occur in the documents to be located.

OIL
SPILLAGE
SPILLAGES

5 List synonymous words and phrases that might occur in addition to or instead of those listed in block 4.

PETROLEUM
GASOLINE
GAS
SPILL
SPILLS
LEAKAGE
LEAKAGES
DISCHARGE
DISCHARGES

6 List roots for the words in blocks 4 and 5.

SPILLAG(R)
LEAKAG(R)
DISCHARG(R)

7 Check Word Frequency List.

8 Indicate the relationships between words, phrases and groups of words and phrases that should exist in the relevant documents: specific word distance, word proximity, sentence, paragraph, entire document. Put NOT before words and phrases whose presence in any of the above relationships indicates a document is irrelevant.

PRINT

OIL WORDS and SPILLAGE WORDS in the same sentence.

9 Write computer search and context or print instructions here.

Written by don lepance
Date Sept 11 '72
Aspenzearch Request No. ____
Aspenzearch Title ____

NAME ____
ORGANIZATION ____
ADDRESS ____
CONTACT ____
TELEPHONE ____

LIST 1
HILITE POLLUTION, ECOLOG(R)
LIST1 OIL, PETROLEUM, GASOLINE, GAS
LIST2 SPILL, SPILLS, SPILLAG(R), DISCHARG(R), LEAKAG(R)
LIST3 LIST1 & LIST2 (SEN)
PRINT

NOTE List any words and phrases considered but rejected and the reason for rejection.

SEARCH INSTRUCTIONS

Use OR

Use AND

Use (R) to designate root words for searching.

CONTEXT INSTRUCTIONS

PRINT INSTRUCTIONS

Use PRINT for full text of documents.
Use PRINT TYPE (1, 2, 4) for citations, titles and classifying phrases.
Use PRINT TYPE (1) for citations only.

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FIGURE 10.
SDI - Abstract Printout of
Recently Enacted Legislation
(All 50 States)

```
POLLUTION

DOCUMENT NUMBER: 42         LIST17

TEXT:

    Cal R       24 1
    requesting federal agency action - E Feb 13
    NATURAL RESOURCES:  Petitions the President and appropriate officials to        NATURAL, RESOURCES
allow stricter state regulation of gas and oil drilling in federal waters and
to halt the drilling on federal tidelands in the Santa Barbara Channel.

POLLUTION

DOCUMENT NUMBER: 66         LIST17

TEXT:

    Me  C     522 1
    AM section 29.2127.2 - E Jan 19
    Motor Vehicle Equipment:  Adds LPG-powered vehicles to those exempted from
AIR POLLUTION control requirements.                                               AIR, POLLUTION

POLLUTION

DOCUMENT NUMBER: 77         LIST17

TEXT:

    Me  C     535 2
    AM sections 10.2155, 12.3752.6 - E Jan 23
    POLLUTION Control:  Provides for hearings and suspension of licenses and        POLLUTION
permits, for engaging in offshore mineral retrieval activities.

POLLUTION

DOCUMENT NUMBER: 1491       LIST17

TEXT:

    N.J.R       9 1
    Setting forth policy - E Nov 5
    POLLUTION Control:  Sets forth the States policy to enact and administer        POLLUTION
laws, codes, and regulations designed to limit AIR, WATER, and NOISE POLLUTION    AIR, WATER, NOISE, POLLUTION
and to regulate USE of NATURAL RESOURCES.                                         USE, NATURAL, RESOURCES
```

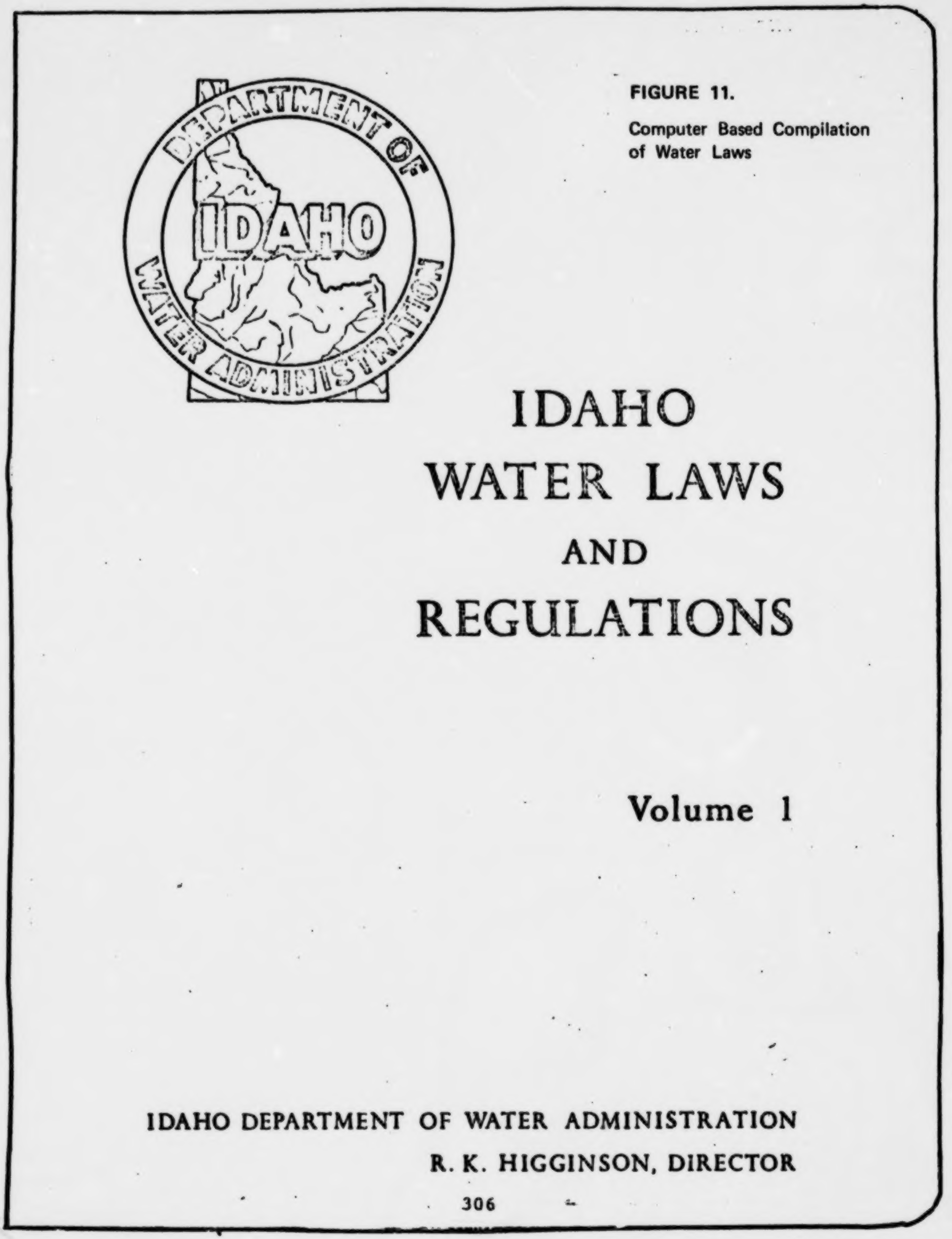


FIGURE 11.

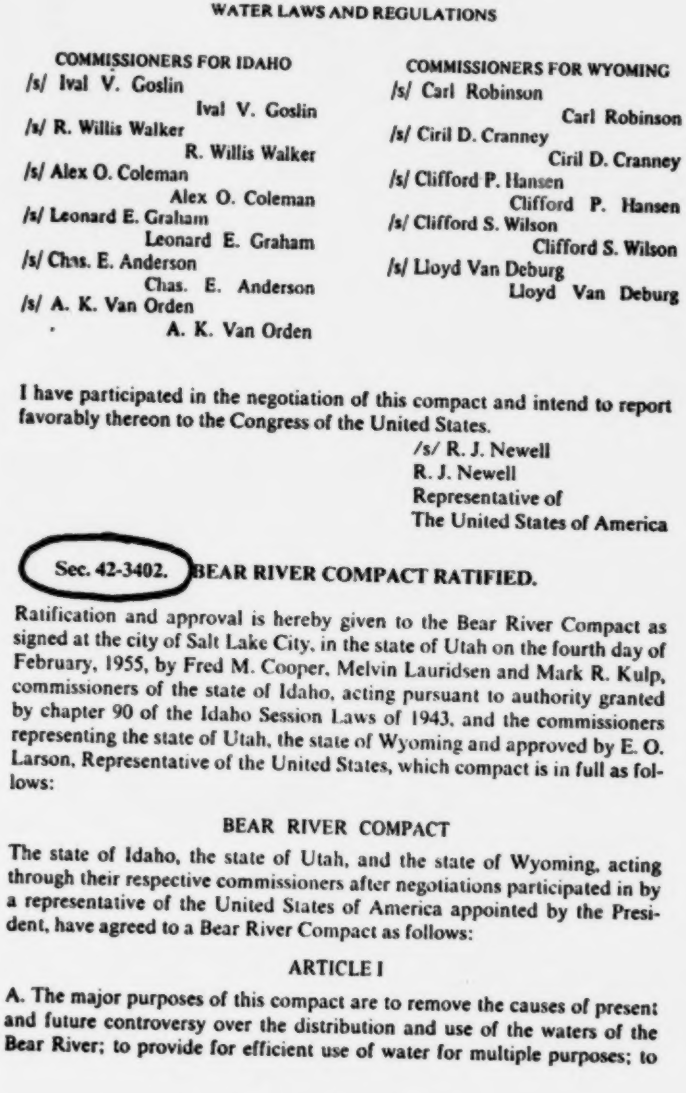
Computer Based Compilation of Water Laws

IDAHO
WATER LAWS
AND
REGULATIONS

Volume 1

IDAHO DEPARTMENT OF WATER ADMINISTRATION
R. K. HIGGINSON, DIRECTOR

FIGURE 12.
Compilation of Idaho Water Laws & Regulations
(produced by Aspen Systems Corporation)



WATER LAWS AND REGULATIONS

COMMISSIONERS FOR IDAHO
/s/ Ival V. Goslin
Ival V. Goslin
/s/ R. Willis Walker
R. Willis Walker
/s/ Alex O. Coleman
Alex O. Coleman
/s/ Leonard E. Graham
Leonard E. Graham
/s/ Chas. E. Anderson
Chas. E. Anderson
/s/ A. K. Van Orden
A. K. Van Orden

COMMISSIONERS FOR WYOMING
/s/ Carl Robinson
Carl Robinson
/s/ Ciril D. Cranney
Ciril D. Cranney
/s/ Clifford P. Hansen
Clifford P. Hansen
/s/ Clifford S. Wilson
Clifford S. Wilson
/s/ Lloyd Van Deburg
Lloyd Van Deburg

I have participated in the negotiation of this compact and intend to report favorably thereon to the Congress of the United States.

/s/ R. J. Newell
R. J. Newell
Representative of
The United States of America

Sec. 42-3402. BEAR RIVER COMPACT RATIFIED.

Ratification and approval is hereby given to the Bear River Compact as signed at the city of Salt Lake City, in the state of Utah on the fourth day of February, 1955, by Fred M. Cooper, Melvin Lauridsen and Mark R. Kulp, commissioners of the state of Idaho, acting pursuant to authority granted by chapter 90 of the Idaho Session Laws of 1943, and the commissioners representing the state of Utah, the state of Wyoming and approved by E. O. Larson, Representative of the United States, which compact is in full as follows:

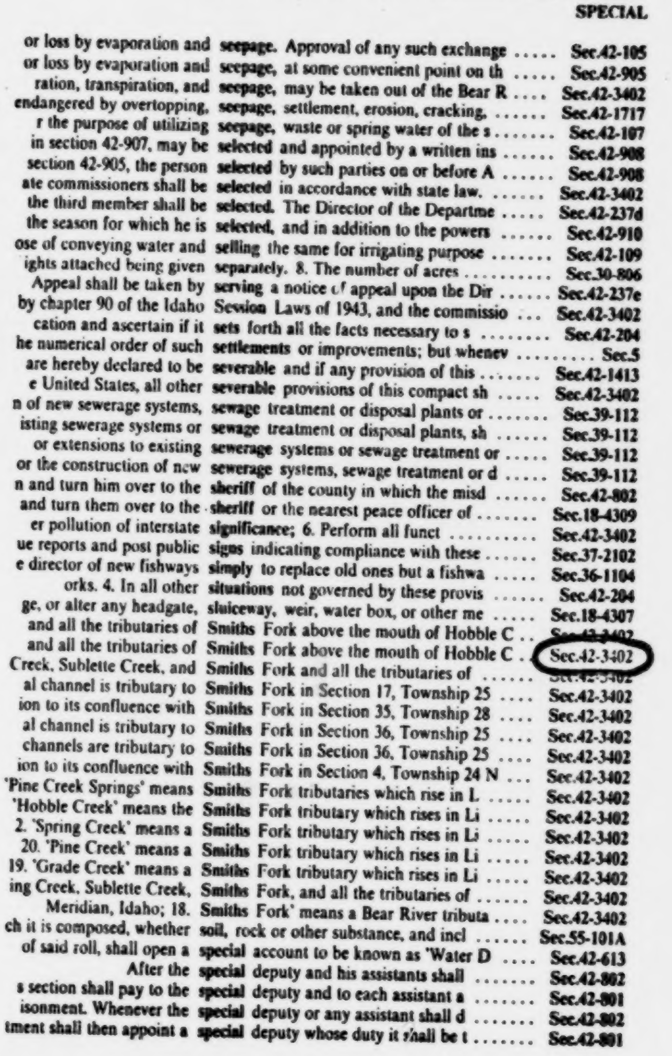
BEAR RIVER COMPACT

The state of Idaho, the state of Utah, and the state of Wyoming, acting through their respective commissioners after negotiations participated in by a representative of the United States of America appointed by the President, have agreed to a Bear River Compact as follows:

ARTICLE I

A. The major purposes of this compact are to remove the causes of present and future controversy over the distribution and use of the waters of the Bear River; to provide for efficient use of water for multiple purposes; to

(TEXT PAGE)



SPECIAL

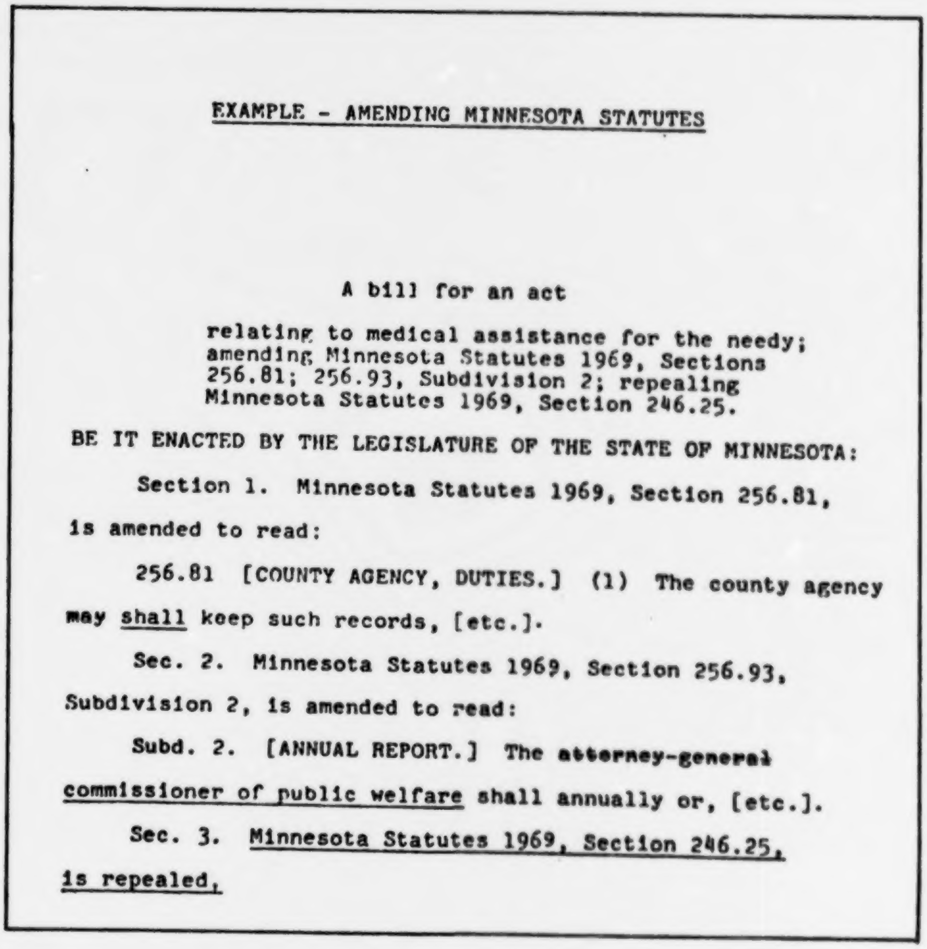
or loss by evaporation and	**seepage.** Approval of any such exchange	Sec.42-105
or loss by evaporation and	**seepage,** at some convenient point on th	Sec.42-905
ration, transpiration, and	**seepage,** may be taken out of the Bear R	Sec.42-3402
endangered by overtopping,	**seepage,** settlement, erosion, cracking, ...	Sec.42-1717
r the purpose of utilizing	**seepage,** waste or spring water of the s	Sec.42-107
in section 42-907, may be	**selected** and appointed by a written ins	Sec.42-908
section 42-905, the person	**selected** by such parties on or before A	Sec.42-908
ate commissioners shall be	**selected** in accordance with state law.	Sec.42-3402
the third member shall be	**selected.** The Director of the Departme	Sec.42-237d
the season for which he is	**selected,** and in addition to the powers	Sec.42-910
ose of conveying water and	**selling** the same for irrigating purpose	Sec.42-109
ights attached being given	**separately.** 8. The number of acres	Sec.30-806
Appeal shall be taken by	**serving** a notice of appeal upon the Dir	Sec.42-237e
by chapter 90 of the Idaho	**Session** Laws of 1943, and the commissio ...	Sec.42-3402
cation and ascertain if it	**sets** forth all the facts necessary to s	Sec.42-204
he numerical order of such	**settlements** or improvements; but whenev	Sec.5
are hereby declared to be	**severable** and if any provision of this	Sec.42-1413
e United States, all other	**severable** provisions of this compact sh	Sec.42-3402
n of new sewerage systems,	**sewage** treatment or disposal plants or	Sec.39-112
isting sewerage systems or	**sewage** treatment or disposal plants, sh	Sec.39-112
or extensions to existing	**sewerage** systems or sewage treatment or	Sec.39-112
or the construction of new	**sewerage** systems, sewage treatment or d	Sec.39-112
n and turn him over to the	**sheriff** of the county in which the misd	Sec.42-802
and turn them over to the	**sheriff** or the nearest peace officer of	Sec.18-4309
er pollution of interstate	**significance;** 6. Perform all funct	Sec.42-3402
ue reports and post public	**signs** indicating compliance with these	Sec.37-2102
e director of new fishways	**simply** to replace old ones but a fishwa	Sec.36-1104
orks. 4. In all other	**situations** not governed by these provis	Sec.42-204
ge, or alter any headgate,	**sluiceway,** weir, water box, or other me	Sec.18-4307
and all the tributaries of	**Smiths** Fork above the mouth of Hobble C ..	[illegible]
and all the tributaries of	**Smiths** Fork above the mouth of Hobble C ..	Sec.42-3402
Creek, Sublette Creek, and	**Smiths** Fork and all the tributaries of	[illegible]
al channel is tributary to	**Smiths** Fork in Section 17, Township 25	Sec.42-3402
ion to its confluence with	**Smiths** Fork in Section 35, Township 28	Sec.42-3402
al channel is tributary to	**Smiths** Fork in Section 36, Township 25	Sec.42-3402
channels are tributary to	**Smiths** Fork in Section 36, Township 25	Sec.42-3402
ion to its confluence with	**Smiths** Fork in Section 4, Township 24 N ...	Sec.42-3402
'Pine Creek Springs' means	**Smiths** Fork tributaries which rise in L	Sec.42-3402
'Hobble Creek' means the	**Smiths** Fork tributary which rises in Li	Sec.42-3402
2. 'Spring Creek' means a	**Smiths** Fork tributary which rises in Li	Sec.42-3402
20. 'Pine Creek' means a	**Smiths** Fork tributary which rises in Li	Sec.42-3402
19. 'Grade Creek' means a	**Smiths** Fork tributary which rises in Li	Sec.42-3402
ing Creek, Sublette Creek,	**Smiths** Fork, and all the tributaries of	Sec.42-3402
Meridian, Idaho; 18.	**Smiths** Fork' means a Bear River tributa	Sec.42-3402
ch it is composed, whether	**soil,** rock or other substance, and incl	Sec.55-101A
of said roll, shall open a	**special** account to be known as 'Water D	Sec.42-613
After the	**special** deputy and his assistants shall	Sec.42-802
s section shall pay to the	**special** deputy and to each assistant a	Sec.42-801
isonment. Whenever the	**special** deputy or any assistant shall d	Sec.42-802
tment shall then appoint a	**special** deputy whose duty it shall be t	Sec.42-801

(INDEX PAGE)

FIGURE 13.

Sample of Bill On Text Editing Screen (Aspen Qwik-Draft)

SAMPLE PAGE



EXAMPLE - AMENDING MINNESOTA STATUTES

A bill for an act

relating to medical assistance for the needy; amending Minnesota Statutes 1969, Sections 256.81; 256.93, Subdivision 2; repealing Minnesota Statutes 1969, Section 246.25.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MINNESOTA:

Section 1. Minnesota Statutes 1969, Section 256.81, is amended to read:

256.81 [COUNTY AGENCY, DUTIES.] (1) The county agency ~~may~~ shall keep such records, [etc.].

Sec. 2. Minnesota Statutes 1969, Section 256.93, Subdivision 2, is amended to read:

Subd. 2. [ANNUAL REPORT.] The ~~attorney-general~~ commissioner of public welfare shall annually or, [etc.].

Sec. 3. Minnesota Statutes 1969, Section 246.25, is repealed,

START STEPS

TITLE and ENACTING CLAUSE STEPS

TEXT STEPS

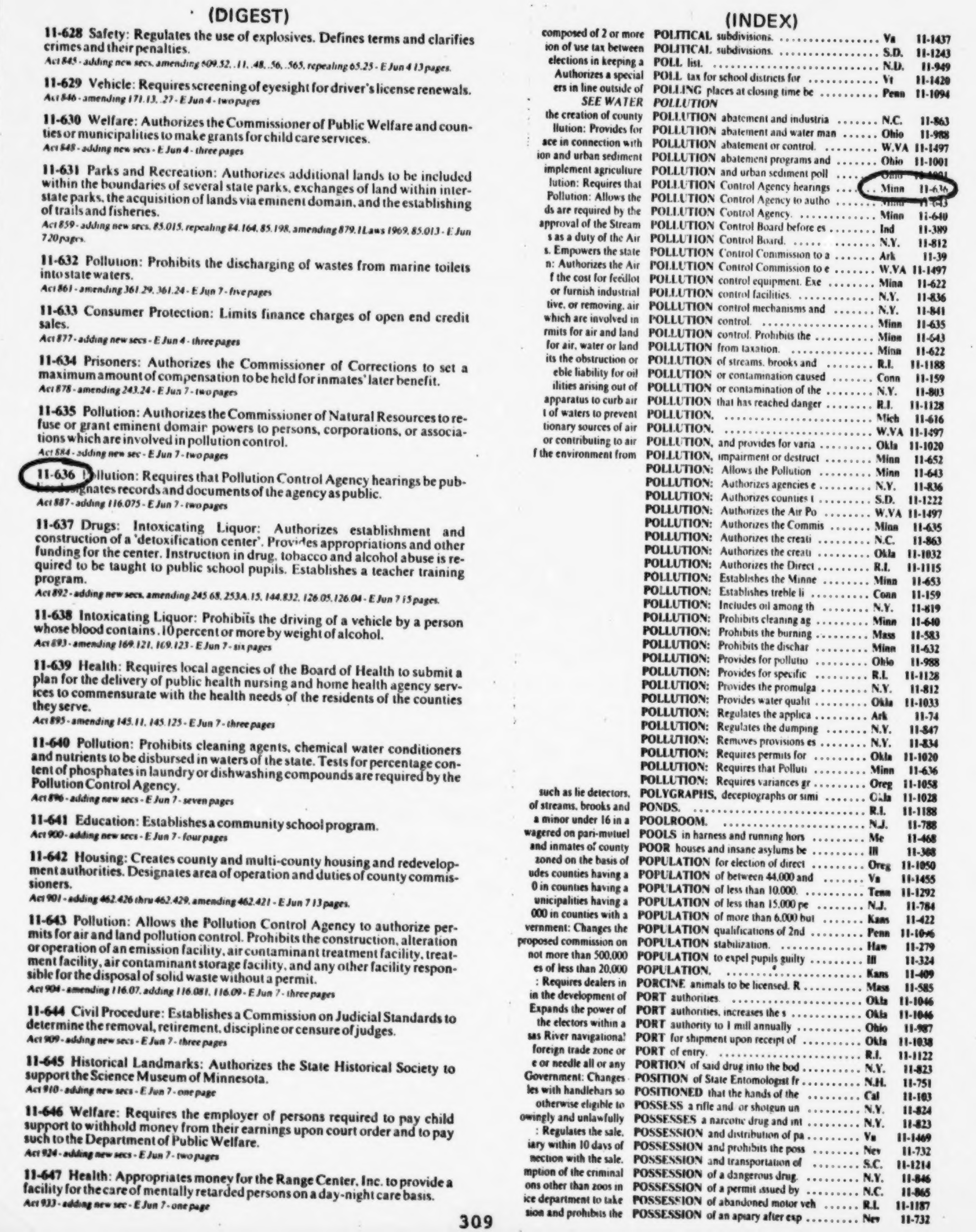
REVISION STEPS

FINISH STEPS

REVIEW STEPS

PRINT STEPS

FIGURE 14.
Published Digest and Index



(DIGEST)

11-628 Safety: Regulates the use of explosives. Defines terms and clarifies crimes and their penalties.
Act 845 - adding new secs, amending 609.52, .11, .48, .56, .565, repealing 65.25 - E Jun 4 13 pages.

11-629 Vehicle: Requires screening of eyesight for driver's license renewals.
Act 846 - amending 171.13, .27 - E Jun 4 - two pages

11-630 Welfare: Authorizes the Commissioner of Public Welfare and counties or municipalities to make grants for child care services.
Act 848 - adding new secs - E Jun 4 - three pages

11-631 Parks and Recreation: Authorizes additional lands to be included within the boundaries of several state parks, exchanges of land within interstate parks, the acquisition of lands via eminent domain, and the establishing of trails and fisheries.
Act 859 - adding new secs, 85.015, repealing 84.164, 85.198, amending 879.1Laws 1969, 85.013 - E Jun 7 20 pages.

11-632 Pollution: Prohibits the discharging of wastes from marine toilets into state waters.
Act 861 - amending 361.29, 361.24 - E Jun 7 - five pages

11-633 Consumer Protection: Limits finance charges of open end credit sales.
Act 877 - adding new secs - E Jun 4 - three pages

11-634 Prisoners: Authorizes the Commissioner of Corrections to set a maximum amount of compensation to be held for inmates' later benefit.
Act 878 - amending 243.24 - E Jun 7 - two pages

11-635 Pollution: Authorizes the Commissioner of Natural Resources to refuse or grant eminent domain powers to persons, corporations, or associations which are involved in pollution control.
Act 884 - adding new sec - E Jun 7 - two pages

11-636 Pollution: Requires that Pollution Control Agency hearings be pub[illegible]gnates records and documents of the agency as public.
Act 887 - adding 116.075 - E Jun 7 - two pages

11-637 Drugs: Intoxicating Liquor: Authorizes establishment and construction of a 'detoxification center'. Provides appropriations and other funding for the center. Instruction in drug, tobacco and alcohol abuse is required to be taught to public school pupils. Establishes a teacher training program.
Act 892 - adding new secs, amending 245.68, 253A.15, 144.832, 126.05, 126.04 - E Jun 7 15 pages.

11-638 Intoxicating Liquor: Prohibits the driving of a vehicle by a person whose blood contains .10 percent or more by weight of alcohol.
Act 893 - amending 169.121, 169.123 - E Jun 7 - six pages

11-639 Health: Requires local agencies of the Board of Health to submit a plan for the delivery of public health nursing and home health agency services to commensurate with the health needs of the residents of the counties they serve.
Act 895 - amending 145.11, 145.125 - E Jun 7 - three pages

11-640 Pollution: Prohibits cleaning agents, chemical water conditioners and nutrients to be disbursed in waters of the state. Tests for percentage content of phosphates in laundry or dishwashing compounds are required by the Pollution Control Agency.
Act 896 - adding new secs - E Jun 7 - seven pages

11-641 Education: Establishes a community school program.
Act 900 - adding new secs - E Jun 7 - four pages

11-642 Housing: Creates county and multi-county housing and redevelopment authorities. Designates area of operation and duties of county commissioners.
Act 901 - adding 462.426 thru 462.429, amending 462.421 - E Jun 7 13 pages.

11-643 Pollution: Allows the Pollution Control Agency to authorize permits for air and land pollution control. Prohibits the construction, alteration or operation of an emission facility, air contaminant treatment facility, treatment facility, air contaminant storage facility, and any other facility responsible for the disposal of solid waste without a permit.
Act 904 - amending 116.07, adding 116.081, 116.09 - E Jun 7 - three pages

11-644 Civil Procedure: Establishes a Commission on Judicial Standards to determine the removal, retirement, discipline or censure of judges.
Act 909 - adding new secs - E Jun 7 - three pages

11-645 Historical Landmarks: Authorizes the State Historical Society to support the Science Museum of Minnesota.
Act 910 - adding new secs - E Jun 7 - one page

11-646 Welfare: Requires the employer of persons required to pay child support to withhold money from their earnings upon court order and to pay such to the Department of Public Welfare.
Act 924 - adding new secs - E Jun 7 - two pages

11-647 Health: Appropriates money for the Range Center, Inc. to provide a facility for the care of mentally retarded persons on a day-night care basis.
Act 933 - adding new sec - E Jun 7 - one page

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mption of the criminal	**POSSESSION** of a dangerous drug.	N.Y.	11-846
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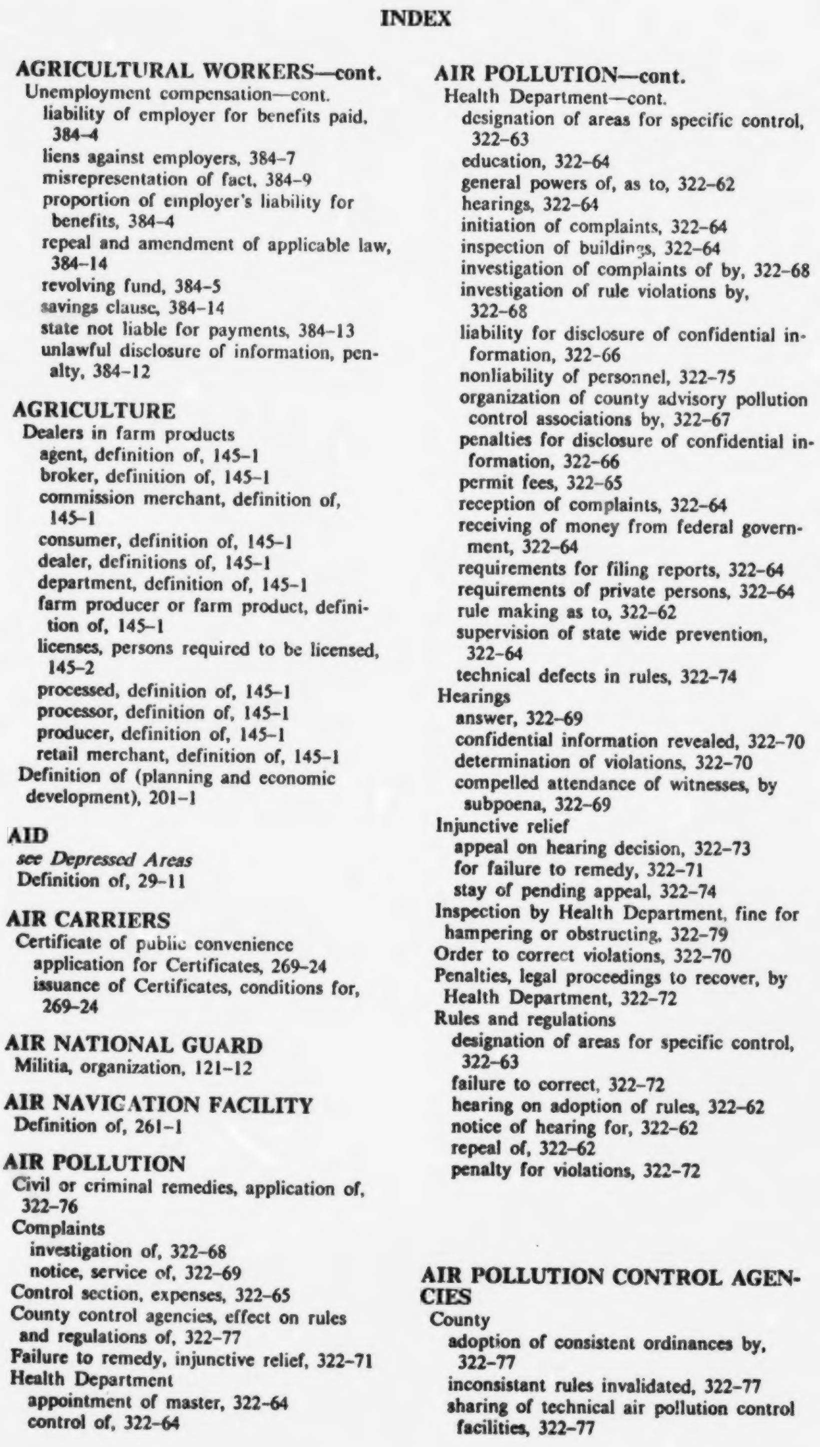
FIGURE 15.

Traditional Hierarchical Index



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LEGAL BIBLIOGRAPHY:
A CRITICAL OVERVIEW

By

George S. Grossman
Professor of Law and Law Librarian
University of Utah

I would like to begin by conveying to you Professor Mersky's regrets at not being able to be here. He was scheduled to speak, but he was unable to attend because he has found his time entirely taken up with preparations for a very demanding assignment. He is departing soon for a one-year visit to Israel, where he will undertake both the job of National Librarian and the job of head librarian of Hebrew University. Those jobs are roughly equivalent to the Librarian of Congress and the Director of the Harvard Libraries; so I am sure you will understand that he has become quite busy in getting ready.

I would also like to begin with an apology of my own. I would like to apologize to those in the audience who are attorneys, if some of what I have to say sounds somewhat like a review of freshman legal bibliography. I am told that most of those attending this Symposium are not lawyers; so I feel it necessary to briefly define the legal tools I will be dealing with.

But before the lawyers in the audience leave, let me hasten to add that I hope to do more than merely define the tools of legal research. I hope to examine these tools critically, and one of my major criticisms is directed at the legal profession itself; for perhaps the most striking aspect of legal bibliography is the almost total lack of involvement on the part of practicing profession in the publishing process. In other professions, the leading research journals are usually published by professional associations; in law, the journals of bar associations and other professional groups are looked upon as intellectual light-weights. Other professions devote a great deal of effort to monitoring, improving, and sometimes maintaining their reference tools;

in law, this is almost entirely left to commercial publishers.

In law, professional influence on the shaping of the system is imperceptible; the communication from users of reference tools to publishers is practically non-existent; no legal professional association today is engaged in the ascertainment of lawyers' information needs or in the effort to shape legal research tools to meet those needs.[1] Even elementary forms of communication between publishers and publication users -- such as market surveys or product testing -- are virtually unheard of. One would think that simple self-interest should lead publishers to initiate such communications, but, perhaps, the market structure of law publishing explains why such communication is absent. That structure is dominated by one giant - West Publishing - which has monopoly control over the most important tools.

To describe legal bibliography, it is necessary first to separate primary and secondary sources. Other professions frequently use this terminology, but in law the meaning is not quite like that in any other profession. That is because the legal profession has some writings which partake of a magic quality -- they have the force of law. These are the writings referred to as "primary." Secondary writings consist of writings about law.[2]

The primary sources are usually subdivided according to the branch of government from which they emanate -- the executive, the legislative, or the judicial. For legal bibliography, the importance of the three branches has traditionally run in the reverse order, the judiciary being first.

CASES-PUBLICATION

The publication and indexing of case law still follows the pattern established in the late Nineteenth Century. The system is wastefully overlapping.

Judicial opinions are published in "slip" form by the court, as advance sheets by West Publishing, and as hard bound volumes often by both West and the state printer.

Not only is publication duplicated between the official set and the West set, but a decision may appear several more times in several other sets. For example, the American Law Reports of the Bancroft-Whitney Company, or in any of several subject-oriented reports, such as the Environment Reporter--Cases of the Bureau of National Affairs.

CASES-INDEXING

Cases are generally published in rough chronological order. To provide subject access to any set of case reports, it must be indexed.

The indexing of cases is almost exclusively the province of the West Publishing Company. The American Digest System and various regional and state digests, with their familiar "key numbers" and abstracts, have been the main tool of legal research since first published in 1896.

In using the West Digests, it becomes apparent that the legal profession pays a significant price for its lack of communication with publishers. For example, in Environmental Law today, it is virtually impossible to do adequate research in the digests. West key numbers scatter environmental cases under general topics such as "Health," "Navigable Waters," "Nuisance," "Water and Water

Courses," and even broader topics such as "Municipal Corporations," "Statutes," and "United States." No specific environmental key numbers bring these cases together again. Even in the descriptive word indexes at the end of each set of the digests, the terminology of Environmental Law is not indexed.

Judging from the past, it may be awhile until Environmental Law comes into its own in the digests. For example, Labor Law did not receive its own key numbers until 1956. Of course, even after a key number is finally assigned to a new subject, research problems remain, for the editors never go back to reprocess those cases which were indexed prior to the new key number.

CASES-GAPS

Another defect of case publication which renders research difficult is the fact that only certain cases are reported. For most states, only the decisions of the top appellate court are covered. Only in the federal courts are the decisions of the lowest courts included in the reporters.

Even those courts which are covered in the reports are not covered comprehensively. I have recently had an opportunity to publish an account of an environmental law case from Utah, in which I was peripherally involved, and for which the key precedent consisted of an unpublished case from the Federal District Court for Colorado.[3] Currently, I am getting interested in the area of cable television regulation. The leading case in this field in Utah is a decision of the Utah Supreme Court which is also unpublished.[4] It consists simply of a "minute order" which may be read only in the "minute book" in the Court's chambers.

Another serious gap in the availability of information about cases is the lack of coverage for pending cases. Lawyers doing lengthy research and writing long briefs never can be sure that they are not unnecessarily duplicating efforts which another lawyer had recently gone through.

Of course, case reporting can never be truly comprehensive. There is simply too much to report, and lawyers already complain about the existing volume of publications. Selectivity is inevitable. The trouble lies in who is and who is not involved in the selection process. The decisions now are made by professional editors, and the users of the information have no way to make their needs known to the editors. For example, the case I mentioned from the Federal District Court in Colorado was cited by one of the leading experts in Environmental Law, Joseph Sax, as "one of the most extraordinary law suits yet to arise in the area of environmental litigation."[5] But such expert opinion has no impact on what is or what is not included in the legal bibliographic system. What is needed, particularly in a new, rapidly growing and highly interdisciplinary area like Environmental Law, is a means for the generators and users of information to make their input into the decisions involving bibliographic control.

So far, I have dealt only with cases; but bibliographic control over the publications of the other branches of government -- the legislative and the executive -- is even less adequate than control over judicial decisions.

LEGISLATION-PUBLICATION

After enactment, legislation is published in two forms: In the session laws, which are arranged chronologically, and in the codes which are arranged by subject and often annotated to cite legislative histories and interprative cases.

Although the codes reprint the full texts of statutes in force, the session laws continue to be consulted for historical research on statutes which have been repealed or amended, and for the most current legislative session, which is generally published in the session laws sooner than in the codes.

LEGISLATION-INDEXING

In addition to having to consult both codes and session laws, statutory publications are difficult to use because of the lack of a national statutory index. To do national research, it is necessary to consult the indexes to the codes of all 51 jurisdictions; and the codes, of course, vary in their indexing nomenclatures.

LEGISLATION-GAPS

Legislative research also suffers from the unavailability of certain publications. On the federal level, published sources include the hearings and reports of congressional committees and the Congressional Record, which records floor debate. Such materials are valuable because they throw light on the legislature's intent.

On the state level, legislative history materials are very difficult to obtain. The difficulty increases as the level of government decreases. County or municipal legal sources are generally less available and more poorly indexed than the publications of higher levels of government.

The same may be said of time-gaps in the availability of legislation. For federal legislation we have the weekly

Congressional Quarterly service, the Digest of Public Bills & Resolutions (bi-weekly), C.C.H. Congressional Index, and the efforts of the Library of Congress Congressional Research Service. On a state level, few such services exist. The computer-produced Monthly Digest of Current Legislation, of ASPEN Systems, provides some relief at the state level; but it is only an index. Full texts of statutes may be obtained only on request.

ADMINISTRATIVE LAW

On all levels of government, the most difficult area of legal research is administrative law.

On the federal level, rules and hearings are indexed in the Code of Federal Regulations which is updated by the Federal Register. Administrative materials are also covered in the Modern Federal Practice Digest and in various portions of the Shepard's citators, which is a set designed to link citations with the original work cited. (Those in the sciences are familiar with this device from the Science Citation Index.) Again, state and local governments are seldom provided with similar indexing.

Perhaps the greatest difficulty in researching administrative law lies in the fact that, because single agencies conduct all three phases of government--they legislate, judge, and enforce--partically everything agencies do partakes of the quality of law. A policy letter, a press release, the minutes of an internal meeting can each effectively alter the law. Lawyers and others who would keep up with such developments must literally maintain daily personal touch with the agencies -- and it often helps to know such insiders. Such is hardly the description of a rational information system.

Two writers recently referred to much of administrative law "secret law,"[6] "secret" not so much because there are deliberate attempts to keep generally significant information from the public, but "secret" simply because of inadequate bibliographic control. (Of course, deliberate witholding of information has also been a problem. Otherwise we would not need a Freedom of Information Act[7] -- which, incidently, we still need.)

SECONDARY

You will recall that at the beginning I divided all legal materials into primary and secondary sources. So far I have discussed only primary sources. Turning to secondary sources, among the most striking features of legal research are that it concentrates almost exclusively on examining the law; it seldom examines the world in which the law operates. It has traditionally been library research -- not empirical research. It is generally the effort of individuals -- not of groups or research organizations.

Despite the efforts of Legal Realists since the 1930's, no real tradition of interdisciplinary legal research has developed. One of the major problems we now face in areas such as Environmental Law is to get lawyers out of their traditional insularity and to get them into genuine interdisciplinary work. To do this, one of the major challanges faced by publishers is the development of truly interdisciplinary information access.

This problem exists on two levels: Environmental Law not only involves a variety of disciplines -- in the social sciences, in the sciences and even in the humanities -- but it also involves several fields within law. Topics such as standing, class actions, the trust doctrine, nuisance, tax, insurance and others certainly are not limited to Environmental Law, although they play a large part in it. In fact, it is difficult to identify an area which is strictly speaking "Environmental Law."

What is happening in fields like Environmental Law is that we are becoming problem-oriented rather than discipline-oriented; and as we look at the problems, they impose their own framework -- they have little regard for our traditional divisions between disciplines. This should radically alter our information system -- our curriculum, our law and our whole culture.

PERIODICALS

Another feature of legal research is that it is concentrated in the law schools. In fact, the major sources of secondary legal information are the law reviews, produced largely by law faculty and students.

The major research tool for approaching the law reviews is, of course, the Index to Legal Periodicals. To read a catalog of horrors of what a reference tool should not be like, read the recent observations of Professor Jacobstein, Law Librarian of Stanford, examining the Index to Legal Periodicals.[8] To summarize, the main faults of the I.L.P. lie in the poor quality of its indexing, in the excruciating slowness of its updating, and in its exclusion of relevant articles.[9] An example of the last cited fault is that Ecology Quarterly published by the Law School of the University of California at Berkeley is indexed, but Environmental Affairs, published by Boston College Law School and Environmental Law, published by the Law School of Lewis and Clark College, are not. Also excluded are interdisciplinary journals such as the Yale Review of Law and Social Action, the Columbia Journal of Human

Rights Law, and Law and Computer Technology.

Nor does the Index to Legal Periodicals provide any coverage of law-related articles in non-legal journals. For that, we must turn to the Index to Periodical Articles Related to Law, published by Oceana Publications, which was privately started by two law librarians, Professor Jacobstein, and our absent speaker, Professor Mersky, in desperation to provide some access for lawyers to such materials.

It should also be noted that neither periodical index provides abstracts of articles. Nor do the law reviews themselves contain abstracts at the beginnings of articles.

MONOGRAPHS

To turn to monographs, two bibliographic items should be mentioned: the multi-volume bibliography, Law Books Recommended for Libraries, published for the Association of American Law Schools by the Rothman Company, is perhaps the major tool for the library selection of legal monographs. It, too, exhibits a sluggishness in areas of current interest. For example, no sections are included for Environmental Law, or other newly developing areas such as Poverty Law.

The second monograph bibliography worthy of mention is the monthly, Current Publications in Legal and Related Fields, also published by the Rothman Company. This is the main tool for keeping up with legal publishing on a current basis. Of course, here, again, the range of coverage is rather narrow. In areas such as Environmental Law, where a great volume of materials are pouring out, not only from orthodox commercial sources, but also from sources such as university departments, independent research organizations, citizens groups and government agencies at all levels, bibliographic monitoring becomes extremely difficult. Even the most rum-soaked environmentalist can miss publications. This is partly due to the fact that knowledge about new publications becomes available only after publication. As with cases, statutes, administrative materials and periodical articles, practically no information is available on pending developments.

To improve this situation, a commitment of professional manpower to the bibliographic control process is essential. For bibliographic control over monographs, for information about legislation and administrative developments, for the indexing and digesting of cases and periodical articles, the profession itself must take an interest and communicate its evolving needs to the publishers. The expertise of those who use the information is needed at every stage: to develop the nomenclature governing the input of information; to decide what the data base should be; to develop interest profiles of users so that the system may be responsive; to decide what time factors may be reasonable in the delay of information; and to translate user questions into the language of the system.

Mechanization, of course, should help with the manpower problem. But the advent of mechanized information storage and retrieval makes it all the more imperative that professional expertise be brought to bear in the development of new information tools. As one commentator has remarked, "Mechanization itself can be considered the answer only if one does not understand the question."[10]

In the area of secondary legal publications, both periodicals and monographs have been discussed. There is one other item which should be mentioned before leaving secondary publications -- the legal encyclopedias -- Corpus Juris Secundum and American Jurisprudence. Neither yet has an article dealing with Environmental Law. Just as with the digests, even the refined word-indexes, at the ends of these encyclopedias do not index the terminology of Environmental Law. This is a perfect illustration of the lag in the adaptability of legal research tools to newly developing fields of law. That can only be ascribed to the indifference of the major law publishers to the information needs of lawyers which are not perceptibly tied to a direct sales potential. That indifference is also exemplified by the fact that the West Publishing Company has not even bothered to send an observer to this Symposium.

ENVIRONMENTAL SOURCES

So far, I have spent about 30 minutes coming to the conclusion that those interested in doing legal research in the environmental area will find that the major traditional tools of legal research are not of much use. That leaves about 10 minutes to explore how this area should be researched.

What happens in law publishing is that the inadequacies of the major research tools create an opportunity for the smaller law publishers to jump into the breach. Their therapeutic efforts usually take the form of looseleaf services, the formats of which allow for rapid updating.

In Environmental Law, there are two major looseleaf services -- the Environment Reporter of the Bureau of National Affairs and the Environmental Law Reporter of the Environmental Law Institute.

It may be in order to briefly compare the two. I have been asked a number of times which I recommend; my answer is, that you should have both if you can afford it, because they serve essentially different purposes.

The Environment Reporter is published most frequently (weekly); it follows the traditional role of looseleaf services and passively conveys information. It is no doubt the better known of the two, and on the whole the more comprehensive.

The Environmental Law Reporter is unique, as far as I am aware, among looseleaf services in any field; this is because it is normative; it does not simply convey information neutrally, but in its commentary evaluates the information and recommends legislation and litigation strategy with a definite public interest bias. This is not to say, however, that its orientation detracts from its accuracy.

There are also some differences in the materials included in the two services; what is missed in one reporter, may be included in the other. The Environment Reporter has by far the the greater bulk. It does an ambitious job of reprinting federal legislation and regulations; as well as case law from federal and state courts and from federal administrative hearings; plus state legislation on air, water, solid waste, and land use.

Parenthetically, I must confess that I am somewhat irked by the fact that this massive set, the Environment Reporter, is marketed only as a unit. At least as second copies, certain portions should be marketed separately. The Current Developments volume would be especially interesting by itself, since it contains the type of wide-range coverage which environmentalists should keep up with regularly.

The Environmental Law Reporter contains nothing akin to the Current Developments portion of the Environment Reporter. Its section, called "Summary and Comments" consists mostly of critical case analyses, somewhat on the order of law review case notes, or of similar consideration of administrative or legislative action. The Environmental Law Reporter also provides a much more selective coverage of state legislation than the Environment Reporter.

Nevertheless, the Environmental Law Reporter provides some coverage which the Environment Reporter misses. For example, the Environmental Law Reporter covers pending legislation more thoroughly than the Environment Reporter; it also does a more comprehensive job on the National Environmental Protection Act, publishing regulations of all agencies issued pursuant to the Act, which the Environment Reporter does not do; and the Environmental Law Reporter also does an especially good job on certain select areas -- such as highways.

In its future plans, the Environmental Law Reporter hopes to extend its coverage to local ordinances and to pending draft legislation. Since the Editor of the Environmental Law Reporter is my fellow panelist, may I also suggest the inclusion of interstate compacts and model legislation.

The Environmental Law Reporter also contains some state administrative hearings. I have found no state administrative hearings in the Environment Reporter. And the Environmental Law Reporter, I understand plans to add an abstract-index of secondary publications.

One of the unique features of the Environmental Law Reporter (and to litigators, this may be its most valuable aspect) is that it makes available to subscribers, for 10¢ per page, copies of briefs, memoranda, complaints, answers and other written materials associated with litigation. The Environmental Law Reporter also extends this service to provide copies of select administrative and other materials of interest to environmentalists.

I should also mention that both the Environment Reporter and the Environmental Law Reporter provide some degree of individualized data search by request. In particular, the Environment Reporter is tied into the Smithsonian Institution's Science Information Exchange, which stores information on research in progress -- including some legal research. This is an area where lawyers are extremely short on information. The American Bar Foundation's Index to Legal Theses and Research Projects, the only tool listing research in progress, has not been published since 1964.

OTHER TOOLS

The Environmental Law Reporter and the Environment Reporter are not the only tools specifically servicing environmental lawyers. The C.C.H. Urban Affairs Reporter covers matters dealing with the environment. One of the most notable features of this service is its phenomenal price. It costs $650.00 per year. Incidently, the Environment Reporter costs $340.00 per year, and the Environmental Law Reporter, being subsidized by the Ford Foundation, costs only $100.00 per year.

Among other tools, the Oak Ridge National Laboratory has started about a year ago to publish a service called the Environmental Law Abstracts, which provides an indexing and abstracting service for environmental law articles. Unfortunately, the service does not include law-related articles in non-law journals; and it is troublesome that in their first issue, the editors state that they will update the service by scanning the new issues of the Index to Legal Periodicals. I hope they will do a more thorough job than that.

Nevertheless, the Oak Ridge Project is a promising beginning. I understand that it now might go under for want of financing. I hope that will not be the case, especially since the editors plan to extend the bibliography's reach retroactively to the mid-1950's.

There are, incidently, also some similar abstracting services not restricted to law. The major ones are Pollution Abstracts of LaJolla, California, and Environment Information Access of the Ecology Forum, incorporated of New York. Another new service reprints the tables of contents of environmental journals and annually indexes them. It is called simply Environmental Periodicals. It is published by the International Academy of Santa Barbara.

I should mention, too, the law journals specifically devoted to the environment. I have already touched on the Ecology Quarterly from Berkeley, Environmental Affairs from Boston College, and Environmental Law from Lewis and Clark College. There is also an annual compilation of environmental law articles, called the Environment Law Review, published by the Clark Boardman Company.

Two older journals which often deal with the environment are the Natural Resources Journal from the University of New Mexico Law School, and Natural Resources Lawyer from the American Bar Association. Also if you don't already subscribe, you should certainly get the 102 Monitor from the Council on Environmental Quality. There are also valuable law-related articles in some scientific journals -- especially in the Scientific American, Science and Science and Public Affairs. Other relevant publications include the Clean Air and Water News from the Commerce Clearing House.

Let me mention, too, a couple of bibliographies on the subject. One bibliography which is quite extensive, though unannotated, is appended to the book Law and the Environment, edited by Baldwin and Page. Another is in volume 11 of the Natural Resources Journal at page 205; and yet another, an annotated one, is in volume 2 of the Natural Resources Lawyer, at page 63, updated in volume 3 at page 357. The trouble with all such bibliographies is that they are rapidly outdated.

One publication, not a bibliography, but nevertheless a valuable source of bibliographic information is the Annual Report of the Council on Environmental Quality. Each year's report is packed with information of publications and projects around the country.

There are many other bibliographies and abstracting sources. I have tried to collect as many as I could in the citations to a pamphlet about to be published by the Council of Planning Librarians.[10] That collection, too, is, I'm sure, incomplete. In fact, we have begun to accumulate so many bibliographic services that we are in need of a bibliography of bibliographies.

Another type of reference tool which is needed is a directory. A number of directories are available in the environmental area in general. The National Referral Service of the Library of Congress puts out a number of these. But I have found no directory specifically listing environmental lawyers or research organizations.

The lack of such a directory illustrates that environmental lawyers, too, are victims of the lack of astuteness which plagues the legal profession when it comes to information services. Another example: an important piece of legislation, House Resolution 56, which is to set up a National Environmental Information Center, is virtually assured of passage in both Houses of Congress. When Congressman Dingle held hearings on this proposal (his hearings cover 395 pages) not one witness testified regarding the information needs of environmental lawyers.

The attendance of lawyers at this symposium is a more promising sign. I hope it signals a growing awareness among lawyers of the importance of bibliographic control.

[1] The American Bar Association has a Special Committee on Law Book Publishing Practices, but the attention of this committee has been devoted entirely to the cost of law books and the trade practices of law publishers.

[2] Non-lawyers desiring a basic introduction to legal bibliography should find helpful Morris L. Cohen's Legal Research in a Nutshell (2d ed. 1971) published by West Publishing Company. The most comprehensive treatment of legal research is Price and Bitner, Effective Legal Research (3d ed., 1969), published by Little, Brown & Company.

[3] Panel, "Legal Bibliography of Current Social Problems," 64 L. Library J. 452, 453 (1971).

[4] Community Television of Utah, Inc. v. Warner, Bennett & Lambert, 17 Minute Book 566 (Utah S. Ct., No. 12989, Aug. 9, 1972).

[5] J.Sax, Defending the Environment 206 (1971).

[6] A.F. Ginger & C. MacLeod, "The Rights of the People and the Role of Librarians," 19 Library Trends 96 (1970).

[7] 5 U.S.C. § 552 (1967).

[8] Panel, "Reader Services in Law Libraries," 64 L. Library J. 486, 502 (1971).

[9] To see what bibliographic control over periodical literature should be like, compare Psychological Abstracts. While the Index to Legal Periodicals indexes about 150 journals, all of which are strictly legal, Psychological Abstracts indexes and abstracts over 650 journals, only about 5 to 10% of which are strictly psychological. Of course, psychologists have long been involved directly in the development of their bibliographic tools; their involved studies of citation frequencies, time lags, indexing quality and other aspects of publishing speak highly of their recognition of the importance of bibliographic control. See, R. Daniel, "Psychology," in R. Downs & B. Jenkins, Bibliography: Current State and Future Trends 332 (1967). See also, W. Garvey & B. Griffith, Reports of the American Psychological Association's Project on Scientific Information Exchange in Psychology (1963- .).

[10] Swanson, "On Improving Communication Among Scientists," 22 Bull. Atomic Scientists 9 (1966).

[11] Grossman, Bibliographic Control in Law and the Environment--Surviving an Explosion (1972).

Document Services and Referral Activities in the Legal, Legislative, and Regulatory Area

James B. Adler
Congressional Information Service

Yesterday, Mr. Ruckelshaus discussed the fact that our information problem in this area is not so much lack of information, but a lack of tools of access, storing and retrieval. I think nowhere is this statement truer than in the area of legal, legislative and regulatory publications and data systems that we are talking about today.

The courts, the regulatory and administrative agencies, and legislative bodies at the Federal and state and local levels of this country have shown a frightening ability to produce information. We producers of information retrieval mechanisms are just beginning to meet the need for tools of access to this information. The remarks that I am going to make about what does exist, however inadequate it may be, will emphasize the area that I am most familiar with, which is the Federal legislative process. But I will touch upon some other areas where I feel have some knowledge.

Legislative and regulatory activity in the environmental area has grown to the point where a majority of congressional committees and federal agencies are now creating documents with significance for environmental research. Indeed, it's well over a majority; in the case of Congress, more than two-thirds of the committees on Capitol Hill have in the past year issued publications having a direct and significant impact in the area of environmental information.

Now, there are some committees that you would expect to be active in the environmental field: Public Works, Interior and Insular Affairs, and so on. But it has reached the stage now where you just don't know who is going to produce the next bit of Congressional information on the environment.

In 1971, for example, one of the most significant set of hearings held in the environmental area was on the subject of air pollution; specifically, it was for the Clean Air Tax Air of 1970, which proposed to put a special tax on leaded gasoline. These hearings, which developed a tremendous amount of information on the subject of automobile exhaust emissions, were sponsored by the House Ways and Means Committee.

In 1973, a major issue that will be facing the Joint Committee on Printing, which is the committee charged with the supervision of the Government Printing Office, is whether or not the Government Printing Office should require all government publications to be put out on recycled paper. Now, the normal way for Congress to operate is to charge the staff of the Congressional committee, sometimes with the help of the Congressional Research Service, sometimes with the help of outside agencies, to do as thoroughgoing a study of an issue as possible before legislation is passed. I cannot say for sure that this will happen in regard to this particular question, but if it does, in the years to come the record that is built by the Joint Committee on Printing will probably become an extremely important basic research document for people who are interested in the potential impact on this country of a rapid expansion in the use of recycled paper.

All in all, Congress is now producing research information at the rate of well over 500,000 pages a year of printed material. I would say that somewhere between 50,000 and 100,000 of those pages can fairly be described as being of interest either directly or indirectly to students of environmental affairs. It's an enormous output.

I think that this congressional output, just like governmental information output in general, has suffered from a severe lack of access and bibliographic tools. The government has for many years been the world's largest printer and the world's least effective publisher. As a result, the kinds of bibliographic tools that one habitually uses for research in the commercial publishing area and in the scientific publishing area, have traditionally not existed in the government publishing area. Consequently, people have simply not known what information is there. I think that government information is the most underappreciated and under-utilized major body of valuable information that exists in this country today. The situation is changing, but not as fast as some of us might like.

The information that governments produce tend to be of two types. First of all, some of it is purely and simply a record of legislative or regulatory activity. It is the basic record from which one begins to build if one is operating in the legal and legislative field. However, far more of this material has a second significance, that is to say, it is a record of those public problems and interests with which the government deals.

Congress, for instance, has not always been successful and rarely goes uncriticized as a legislative body. But as an investigative body, it is an extremely active and very powerful force, and it is producing an enormous amount of useful information.

I would like to give you some examples of the kinds of data that emerge out of this huge information machine in the course of a single month, just 30 calendar days. I have taken the month of July, 1972, which was not a particularly productive month from the point of view of environmentally-oriented publications, but one which is, I think, illustrative nonetheless.

Let's talk first about proposed legislation. Nobody knows how many bills there are before Congress right now which bear on environmental matters. There are, I understand, more than 200 bills just on the subject of land management--that gives you some idea of the load that pours into Capitol Hill. During the month of July, five hearings were published in the environmental area. A couple were significant, a couple were less significant. One was a proposed legislation to identify farmers and ranchers and people who raise fowl. There were hearings on legislation having to do with the preservation of historic monuments. There were rather detailed hearings on the proposed Department of Natural Resources. The four-part reorganization plan President Nixon proposed not too long ago raised some very interesting questions about what the setup will be with regard to mines and mining, energy production, and the relationship with the AEC. This was gone into in some detail.

Then there were some rather detailed hearings on proposed amendments to the Lead-Based Paint Poisoning Prevention Act. And, finally, extremely important hearings on the Noise Control Act of 1972.

In addition to that, in the month of July, there were appropriations hearings in which rather detailed testimony and numbers were given with regard to the purposes and the amounts of the budgets for public works, pollucion control, atomic energy, agriculture, environmental protection, housing and urban development, NASA, the scientific agencies, transportation, interior and related agencies.

There was also a Senate Commerce Committee report issued reporting out the Federal Environmental Pesticide Control Act of 1972.

Second, Congress not only creates legislation, it also oversees the implementation of legislation. Published in July, 1972 was a 1,500-page volume entitled, "Legislation on Foreign Relations with its Monetary Notes." This was put out by the House Foreign Affairs Committee. It deals with such subjects as arms control, foreign aid, and has a 200-page chapter on "Law of the Seas" which includes the texts of all the international conventions and protocols dealing with the conservation of ocean fish, fisheries, seals, tuna, whales and sock-eye salmon, including the texts of quite a few pieces of legislation as well as conventions, protocols and treaties.

There was also published in this same month by the Senate Commerce Committee something called a "Compilation of Federal Laws Relating to Conservation and Development of our Nation's Fish and Wildlife Resources, Environmental Quality and Oceanography"--600 odd pages divided into 18 subject areas, compiling dozens of pieces of legislation which have been passed, most of them recently, in this very area.

There were three hearings that were held in the month of July, or rather that were published in the month of July (they were all held earlier), in which Congress has exercised its responsibility to look at the manner in which existing legislation has been implemented and to listen to complaints about faulty or inadequate implementation, or to make its own complaints. Those three pieces of legislation I am referring to are "The National Environmental Policy Act," the "Clean Air Act Amendments of 1970" and an overall look at the current status of aeronautical research and development under the aegis of a number of pieces of legislation.

Now the information content of these and other documents would give you information on such subjects as the extent of the saline seep problem which is causing lion infertility in Montana, the plans of the Geological Survey for a topographical mapping of the State of Alaska, an analysis of the attack being mounted in the U.N. against American policy regarding the development of deep-seabed mineral resources, a compendium of projections from various sources on the anticipated U.S. energy consumption rates through the year 2000, the text of the by-now-famous annual EPA Report on the Economics of Clean Water, and a list of all proposed noise pollution control legislation introduced in state legislatures last year. I could go on, but I think I have made my point. The information is just overwhelming and it's under-used.

It comes from a variety of sources which I would just like to tick off. At the Federal level, obviously these are the legal documents, the statutes that have passed, the U. S. Code, the federal court reports (an area I am not familiar with, but will just touch on). In the regulatory and administrative area, you have those publications which are put out by the Office of the Federal REgister: the Federal Register itself; the Code of Federal Regulations, which is essentially an accumulation of these administrative laws; and the compilations on a weekly and an annual basis of presidential documents. You also have the rulings and other issuances of agencies themselves.

In the legislative area, you have the bills and resolutions themselves, you have the Congressional Record which is, in my view, one of the least important of the publications that we are talking about right now, but somehow the best known. You have House and Senate Documents with a capital "D", you have hearings, you have committee reports, you have committee prints which tend to be staff studies, you have so-called executive documents, you have executive reports and you have special publications. Those last four categories--committee prints, executive documents and reports, and special publications--are not made available to the Federal Documents Depository System, which I understand you've heard something about earlier during the course of this meeting.

To review that system briefly, there are some 1100 libraries in this country which receive free of charge a portion of the Federal publications output from the GPO in return for promising to maintain these documents and and to make them available to the public. In the case of congressional documents, which I know best, approximately 75% of the documents that are issued are in the depository system, the other 25% are not. These last four classes of documents are the ones that are not: committee prints, executive documents, executive reports and special publications of the

House and the Senate as a whole.

It is possible to make some generalizations about Federal documentation; with regard to state and local documentation there really are no generalizations possible except that it's an incredible morass. I just simply can't go beyond that.

Now, what are the available services? At the Federal level, in the legal and regulatory area there is very little and what these is I will leave to other legally-oriented panelists to discuss.

In the legislative area, I am goind to mention a few. A couple really are publications, but people are sometimes confused about what they do, so I want to mention them.

The Congressional Record is a combination of two things. Number one, it is a close-to-verbatim report of floor debate; number two, it is a miscellany into which Members of Congress are permitted to drop things if they would like to see them in print. It occasionally contains some extremely valuable information--there is some wheat among the chaff. I myself feel that the most valuable part of the Congressional Record is the Daily Digest, which is a brief, reasonably accurate, very convenient way of finding out what went on in Congress yesterday.

There are two publications which are very well known, Congressional Quarterly and The National Journal. These are reporting services. They are not indexing services or information retrieval services, despite the fact that National Journal, at least, is very well indexed. They cover the news of the Government, but not its publishing activity or information output.

Then you have the GPO's own Monthly Catalog, which is a reasonably complete listing of woefully inadequate index of most things that pass through the GPO's presses.

For current awareness purposes, GPO also puts out a flyer, a bi-weekly flyer, on selected government publications, which is a useful thing, and it's free, too. I believe it's now called Selected Government Publications. The selection is not necessarily the one you would make, but it does tend to call attention to things which GPO considers of interest and which it has printed recently.

There is a vaguely similar checklist put out by a private, commercial firm called Bernan's Checklist, which announces a selection of items also.

If you are interested in bills and the process of legislation, and want to keep up with it, your best bet is to be working on Capitol Hill so that you can have access to that new computerized system that was described yesterday--otherwise you are in trouble. The most up-do-date bill status reports, not always entirely accurate, but usually on-target most of the time, are published in Congressional Index, which is a service of CCH, Commerce Clearing House.

A somewhat more accurate status report system with excellent bill summaries is put out by the Public Bill Digest, but unfortunately the publication is not very timely.

There is also a service which is aimed primarily at lobbyists called "Congressional Monitor" which has had tremendous ups and downs and is, I think, of limited interest to this audience.

There is also in this Federal legislative area the publication that I represent, CIS/Index. CIS/Index has been designed to perform four functions: Number one, current awareness. We announce every publication within the Congressional area and I believe we are the only comprehensive announcing service. We try to do it within a month after the time the publication has been issued. Second, we are attempting to do a bibliographic control job for people with documents collections. All the bibliographic data which are basic to cataloging a congressional document in a library are provided.

Third, for people who are interested in doing legislative histories, we create very complete legislative histories and publish them on a regular basis.

And finally, and most important, we are an information retrieval system designed for the person who is doing subject research.

The form of the CIS/Index is a monthly publication, an abstracting and indexing service, with quarterly index cumulations and an annual cumulation of the indexes and the abstracts.

In the case of hearing volumes, abstracts are written for each and every witness appearance. The names of all witnesses, the names of all the organizations they represent, the names and bill numbers of the legislation being considered, the subjects that are discussed either in the prepared statements or in the question period of any body's testimony, the subjects of the hearings as a shole, all are indexed. The Index tends to run about 60,000 or 70,000 references a year. It is a system which is designed to provide detailed access to the content of the entire output in this area.

CIS is not alone. There are two other systems which are attempting to do something more or less similar in areas of interest to you. I don't think that either of them has yet been quite so ambitious with regard to indexing detail as CIS, but they still seem to me to be extremely useful.

One is a job which Greenwood Press has begun to do with regard to urban documents. This is a real morass: the publications of cities, regional governments, counties, and so on. "The Index to Current Urban Documents" was announced not too long ago, and will begin publication in Fall 1972.

There is another publication which I believe has been talked about in other meetings here. I am referring to Environmental Information Access, which cuts across documents from various sources and has a special section which abstracts and indexes significant materials appearing in the Federal Register. And anyone who has ever tried to use the index to the Federal Register or the Code of Federal Regulations--that's enough of that.

At the state and local level, in addition to the new index to urban documents, about the only publication that I am aware of that is worth looking at is the Checklist of State Documents which is put out by the Library of Congress.

Now, if you are lucky, maybe you have discovered that the document that contains the information you are looking for not only exists (because in almost all cases it seems it does), but you've discovered where it exists. All you have to do is get your hands on it. What are the documents acquisition services that are available?

I don't think we need to discuss libraries, unless people have some questions about the Depository System.

The GPO, in addition to being a printer, also has a document distribution operation and, indeed, many government documents are available only through the GPO. If you are very patient, you can buy them from GPO.

Or you can try the issuing agency. Many Federal agencies and congressional committees will respond to letters requesting documents, while they last.

If you are interested in a congressional committee publication, they will never charge you for it; but you are much more likely to get what you want reasonably fast if you send them a self-addressed envelope or at least a self-addressed label, so that when they send it back they don't have to put a label on it.

There are some private document services. For years certain local dealers have been providing government documents as a matter of course to their customers. Bernan's has a good reputation. They have essentially what amounts to a book-dealer operation in Washington, specializing in government documents; and there are some new services which operate on a service-charge basis. One that I am aware of that is only a year or two old is called Washington Service Bureau, Inc.

Certain legal, legislative and regulatory documents are available through National Technical Information Service (NTIS). For instance, the environmental impact statements are all available through NTIS.

Now, what about microforms? With microforms there has been a tremendous amount of activity recently in this field. The oldest firm in the field is Readex Microprints, which offers not microfiche, but micro-opaques. Slightly larger than 4x6 microfiche, they have considerable drawbacks from a user standpoint, but they are far better than nothing.

They go back to the 1950's, I believe, and virtually anything that has been in the GPO monthly catalog over the last 10 or 15 years has been put into this microprint form. A decent number of the depository libraries around the country do subscribe to this service. The only way you can get at it, by the way, is through a library.

I mentioned Greenwood Press before. They will issue the Index to Current Urban Documents in conjunction with an urban documents microfiche collection. They have similarly announced a state documents microfiche collection, which will perform a similar service. Here, however, they are not starting from scratch to create an index of current state documents. They are taking the Library of Congress's Checklist of State Documents and annotating it to indicate which ones they are handling. (They are only handling about 70% or 80% of them, which I think is wise.) And that again is a service which I don't believe has begun yet, but it's on the verge.

Third, we have the "Envirofiche" which are published in conjunction with Environment Information Access.

And, fourth, we have the CIS/Microfiche Library--every single document which we abstract and index, every one that we have abstracted and indexed since January, 1970, is available on microfiche through CIS on a subscription basis. We make it available on a full-collection basis and according to certain breakdowns.

Now, what about the future? Well, it's very difficult for me to talk about the future in general because I don't know what other people will be doing.

But I am aware of what CIS itself is doing, and conceivably CIS is typical of the young information processing companies which are attempting to dig into our information overload. It is only a matter of time before CIS's data base, which is rapidly approaching the 30-million character mark, will be available to on-line questioning and retrieval. Right now the only way you can access our indexes is through the printed page. Secondly, we have given some consideration to creating subject collections of microfiche aimed at specialists in a given field.

We are also hoping to make available an indexed microfiche collection of all versions of all public bills introduced in Congress.

Finally, we are aware of the fact that the U. S. Government is not only the largest publisher in the world, it is also the most active collector of statistical data in the world. We are in the process of launching something called the American Statistics Index, which will attempt to classify, catalog, abstract and on a current basis virtually the entire published statistical information output of the Federal Government, a large part of which obviously has bearing on environmental problems.

Our activity is perhaps typical of what private information publishers have begun to do over the last few years. Now that the newer technological tools--the microform, the computer, the computer-driven photocomposition devices--have started to come into their own, is is becoming possible to dig into this enormous flood of information and conceivably bring it under control so that researchers can make better use of it.

There's a long way to go -- but I think you will see a steady improvement over the next few years. At least, it is now possible to try!

Victor John Yannacone, Jr.
Yannacone and Yannacone

Legal/Legislative/Regulatory Sessions

Litigation has been called civilization's alternative to revolution (1), and certainly environmental litigation represents a substantial source of tested and evaluated environmental information of use to scientists (2), engineers (3), legislators (4), officials of regulatory agencies (5), business (6) and industrial managers (7), and the general public. (8)

Within the Anglo-American system of jurisprudence, the bulk of the substantive law (9) is contained in serially promulgated, chronologically published reports of judicial opinions generally grouped for the purpose of binding according to the Court which renders the decision. The entire set of these published judicial opinions and decisions makes up the body of what is traditionally referred to as the Common Law. Over the last one hundred years several attempts have been made by private publishers and government agencies to index and abstract these decisions, and since great weight is placed upon the doctrine of stare decisis (10) within the Anglo-American system of jurisprudence, the need to locate particular precedent becomes more important and more difficult as the elements of the set of all judicial opinions and decisions increase in number.

The generally accepted index and abstract services utilized by the legal profession to search the vast body of Common Law have been the product of private enterprise in the field of legal publishing, and range from the straight forward Sheppard's Citations (11) through the Key Number System of the West Publishing Company (12) to the heavily editorially dependent Total Client Service Library of the Lawyers Cooperative Publishing Company (13).

While there seems to be a movement towards assembling the entire data base for that area of legal concern now generally designated Environmental Law in some form suitable for computer assisted search and retrieval, consideration of the origin of the phrase "Environmental Law" (14) immediately demonstrates the difficulty of defining the data base.

Much of the effort of the participants in the National Environmental Information Symposium and the organizations and institutions they represent has been directed toward serving the needs of legislators, administrative agencies and practitioners in particular areas of Environmental Law. Often environmental litigation has been overlooked as a primary source of environmental information. In order to properly evaluate the substantial environmental information resource represented by environmental litigation, some consideration must be given to the litigation process itself.

One of the principle characteristics of Anglo-American litigation is the adversary nature of the process, which generally commences with service of a document setting forth a claim of right and seeking some legal remedy. (15) Litigation is essentially a dialectic process. In a criminal or quasi-criminal proceeding, the party charging that a crime has been committed (usually Government representing the People of the United States or the People of an individual State, acting as the Sovereign (16)) has the burden of proving that all the elements of the crime have been committed by the party charged, and that burden must be sustained beyond all reasonable doubt. In civil cases, or in the general run of administrative agency proceedings, the burden is on the party seeking relief to establish the right to the relief sought by a fair preponderance of the substantial credible evidence. (17)

A trial is conducted in an essentially linear fashion. The party with the burden of proof generally presents data (18) or other demonstrable (19) evidence in support of the allegations of the complaint or petition. The representative of the adverse party then tests the testimony or evidence offered against three criteria.

> . . .Is the testimony or evidence relevant to the subject matter of the litigation?
>
> . . .Is the testimony or evidence a material contribution to the evidence necessary to satisfy the burden of proof?
>
> . . .Is the witness competent to present the testimony or qualified to introduce the evidence?

Following the dialectic of cross-examination by the representatives of the adverse parties, the court rules, or in some cases the jury finds, whether the evidence offered is admissable; so that at the termination of any trial there is a vast body of well edited and carefully tested information which in matters of environmental litigation represents an often overlooked source of primary environmental information. The most obvious current example is the DDT litigation. The scientific papers, studies and data ultimately accepted as evidence by the Supreme Court of the State of New York in 1966 (20), the Court of Appeals of the State of Michigan and the United States District Court for the Eastern District of Wisconsin Department of Natural Resources in 1968 and 1969 (22), and the United States Environmental Protection Agency in 1972 (23) represents the definitive compilation of the relevant, material evidence on the effects of DDT on non-target organisms. The dialectic process of direct and cross-examination which surrounded the admission of each item of evidence in those trials furnished the kind of editorial review that is lacking in even the most rigorous scientific journals, and furnishes decision makers with a consideration of the relevance of each item to the resolution of the controversy concerning the benefit-risk to the People of the United States occasioned by the continued widespread use of DDT. The dialectic process of direct and cross-examination also suggested new opportunities for scientific research and identified inconsistencies in the existing body of scientific information on the subject available at the time of trial.

There is a substantial need for an environmental data base which is subject to search and retrieval at the level of state-of-the-art in computer information retrieval technology, which includes the full text of federal, state and local laws and regulations. Pending legislation, the opinions of attorneys general, legal scholars and appellate courts, together with the complete legislative history of all environmental legislation must also be included as elements of any complete environmental information system. The scientific information necessary to support ecologically sophisticated, environmentally responsible, socially relevant and politically feasible legislation (24) must also be available in a form readily accessible by legislators, regulatory agencies, the Bench, the Bar, business, industry, and the public.

There is a substantial need to protect the diversity of editorial viewpoint represented by private enterprise in the distribution of environmental information. (25) There is a similar need to encourage the continued concern of public benefit, nonprofit corporations in the area of interdisciplinary cooperation in environmental science. The Federal government, and to a necessarily more limited, but nonetheless important, extent, state and local governments must be encouraged to improve accessibility to government generated or government sponsored data, information, and publications. The National Environmental Information Symposium marks an important preliminary step towards this goal. At the same time we must improve the access of legislators and regulatory agency personnel to data available in the private sector. (26)

It appears that in matters of an inherently controversial character, such as the benefit-risk evaluation of the continued use of certain environmental toxicants and the cost-effectiveness of public projects and certain administrative agency actions, litigation will furnish an increasingly effective and sophisticated means for resolution of issues and reduction of the data base prior to ultimate consideration by legislative bodies and regulatory agencies. It is this often overlooked function of environmental litigation, particularly in cases of substantial public concern involving benefit-risk and cost-effectiveness, which should be of increasing value to legislators and regulatory officials. Unfortunately, unless access to the data base generated during such litigation is improved, much of its value and effectiveness will be lost.

One of the most obvious functions of the National Environmental Information Symposium has been the public demonstration of the enormous quantity of environmental information that does exist and the continued proliferation of private and public processes each contributing to the generation of more environmental information, all without general coordination and some without recognition of the inherently multi-rather than merely inter-disciplinary nature of both Environmental Law and Environmental Science.

Just as it is essentially impossible to practice environmental law without a substantial background in environmental science, it is equally futile to attempt to organize environmental science, or more particularly classify the body of environmental information, without a considered awareness of the needs of society which lead ultimately to the legal regulation of activities having environmental impact.

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5. Yannocone, Victor John, Jr., Bernard S. Cohen, **Steven** Gebauer Davison

1 ENVIRONMENTAL RIGHTS & REMEDIES, Chapter 7, op. cit.

6. Yannacone, Victor John, R., Editor

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American Society of Real Estate Counselors, Chicago, Illinois 1971

7. Yannacone, Victor John, Jr.

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Executive Systems, Inc.
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8. Henkin, Harmon L., Martin J. Merta, James Staples

THE ENVIRONMENT, THE ESTABLISHMENT AND THE LAW
Houghton-Miflin, Boston, 1971

8. Harmer, Ruth Mulvey

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8. Longgood, William

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Simon & Shuster, 1972

9. Substantive law, as contrasted with procedural law, creates, defines and regulates rights, as distinguished from remedies and the procedures for enforcing rights.

Statutes, Rules and Regulations promulgated by legislative bodies or administrative agencies are characterized as substantive or procedural according to the effect of their implementation.

10. The doctrine of stare decisis sets forth the principle that decisions by a Court should stand as precedents for guidance in cases arising in the future.

> "The great principle, stare decisis, so fundamental in our law, and so congenial to liberty, is peculiarly important in popular governments, where the influence of passions is strong, the struggles for power are violent, the fluctuations of party are frequent, and the desire of suppressing opposition, or of gratifying revenge under the forms of law and by the agency of the courts, is constant and active."

Ex parte Bollman 4 Cranch (US) 75, 89; 2 LEd 554, 559.

however,

> "While even a single adjudication of the court, upon a question properly before it, is not to be questioned or disregarded except for the most cogent reasons, and then only in a case where it is plain that the judgment was the result of a mistaken view of the condition of the law applicable to the question, the doctrine of stare decisis is not without exceptions. It does not apply where it can be shown that the law has been misunderstood or misapplied, or where the former determination is evidently contrary to reason."

Rumsey v. N.Y. & N.E. Ry. Co., 133 NY 79; 30 NE 654

The phrase stare decisis derives from the latin phrase, stare decisis et non quieta movere - To stand by the decisions and not to disturb settled points.

Ballantine's Law Dictionary, Third Edition, Lawyers Cooperative Publishing Co., Rochester, New York 1969.

11. Sheppard's Citations provides notational information regarding the current status of legislation and citations to judicial interpretations of statutory law, the Constitution of the United States and the State Constitutions, municipal charters and ordinances, selected federal administrative decisions, and federal and state court rules, as well as furnishing information through coded designations as to how courts ruled subsequently upon case law.

    Sheppard's Citations are not arranged by subject. To enter the Citations, the researcher must have a citation to some case or statute in point. The most common use of the Sheppard's Citations is to determine the present status of statutory law and locate cases which have construed the statutes. Most attorneys also check Sheppard's Case Citations to determine the subsequent history of a case sought to be relied upon as precedent.

12. The Key Number System is a limited thesaurus of 425 titles, or topics arranged alphabetically in the American Digest System. Under this arrangement each principle of law (recognized at the time the System was generally organized - 1896) is given a number within a topic and all cases which apply that principle of law are digested under that number. The topical material is arranged under main divisions, subdivisions and sections. The symbol of a key is used to denote the sections and the designation of the system as the Key Number System derives from the use of the symbol as a replacement for the section sign. The digest paragraphs bear topic and key number designations and both parts are essential to locate cases in point.

13. The Total Client Service Library of the Lawyers Cooperative Publishing Company is an effort to establish an integrated body of legal information ranging from general case reports, with annotations and additional pertinent information such as the United States Supreme Court Reports, Lawyers Edition (L Ed), and American Law Reports, Annotated, (ALR); the encyclopedia, American Jurisprudence; treatises on particular areas of the law; aids to practice such as American Jurisprudence Forms, American Jurisprudence Proof of Facts, and American Jurisprudence Trials.

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1971 Proceedings, Section of Insurance, Negligence & Compensation
Law American Bar Association

15. Yannacone, Victor John, Jr., Bernard S. Cohen, Steven G. Davison

ENVIRONMENTAL RIGHTS & REMEDIES §§ 6:16 op cit.

16. Yannacone, Victor John, Jr., Bernard S. Cohen, Steven G. Davison

ENVIRONMENTAL RIGHTS & REMEDIES §7:6

16. Yannacone, Victor John, Jr.

ENVIRONMENT AND THE LAW, Chapter 18
ENVIRONMENT: Resources, Pollution & Society
ed. William Murdoch
Sinauer Associates, Stamford, Conn. (1971)

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Highlights 70 - 1970 Congress for Recreation & Parks

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Evidence In Environmental Litigation

Trial Lawyers Quarterly, in press
New York State Trial Lawyers Association, New York 1973

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A CHECKLIST FOR WATER POLLUTION LITIGATION
Trial Lawyers Quarterly

NEW YORK STATE TRIAL LAWYERS ASSOCIATION
in press

19. Yannacone, Victor John, Jr.

INDICATOR PLANTS AS DEMONSTRABLE EVIDENCE IN AIR POLLUTION LITIGATION
Trial Lawyers Quarterly

NEW YORK STATE TRIAL LAWYERS ASSOCIATION
in press

20. Yannacone, V. Dennison, et. al.

(Sup.Suff. 1967) 55 Misc 2d 468; 285 N.Y.S. 2d 476
for summary of the evidence presented, see

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TRIALS in press
LAWYERS Cooperative Publishing Co./Bancroft-Whitney Company

21. EDF v. BALL, et. al. (CA Migh 1967)

____Mich____

EDF v. 56 Michigan Communities, (DC/WD/Mich 1967)
United States District Court, Western District Michigan, Southern Division File No 67-5760

22. EDF v. BALL, et.al. (DC/ED Wisc 1968)

In the Matter of the Petition of the Citizens National Resources Association, Inc., et.al. (Department of Natural Resources, State of Wisconsin 1968) 3-DR-1

23. EDF v. U.S. Department of HEW (1970, App/DC)
428 F2d 1083

EDF v. Hardin (1970, App DC)
428 F2d 1093

EDF v. Ruckelshaus (1971, App DC)

24. Yannacone, Victor John, Jr.

GEOLOGY: Bedrock of Environmental Legislation
Proceedings Geological Society of America, Northeast Region, 1971

25. The Environment Reporter

Bureau of National Affairs, Inc.
1231 25th Street, NW.
Washington, D. C. 20037
Weekly. $340.00 yearly.

Environment Information Access

Environment Information Center, Inc.
Publishing Division
124 East 39th Street
New York, New York 10016
Bi-weekly. $150.00 yearly.

Pollution Abstracts

Pollution Abstracts, Inc.
P.O. Box 2369
LaJolla, California 92037
Bi-monthly. $80.00 yearly.

26. Opening Congressional and other Legislative Hearings to permit cross-examination of witnesses by selected representatives of constituencies concerned with the subject matter of the Hearings together with more adversary hearings conducted by Regulatory Agencies at the preliminary stages of Administrative Proceedings would help.

Claude T. Gurley
Information Centers

Before World War II it was usually considered adequate for an individual or an organization to subscribe to appropriate trade publications and attend one or more professional meetings each year to keep up with the state of the art in their particular line of activity. The exchange of ideas and information was frequently done in an informal manner among a few associates. Reading the news media and listening to the radio completed the normal loop of information exchange.

During and after World War II we have experienced a quantum advance in technology. There has been a vast increase in research and development activity throughout the world. Computers were invented and these computers are now so large and operate at such high rates of speed that they can store and retrieve enormous amounts of information on almost a real-time basis. In the same time frame a multitude of very complex problems have surfaced, particularly in the field of ecology. These complex problems make the need for more and better organized data a must. Because these problems interrelate, it forces the correlation of many series of data to assess the problem or address the solution to that problem. This leads to the consideration of the relationship of this multiplicity of ecological problems to social and economic problems.

During the past two decades a flood of data was produced in the general ecological area, but this data needs to be managed and adequately distributed to potential users. Effective management of data in any field, and particularly in ecology, depends upon several factors. First, a degree of standardization of the measurement, method of handling, means of distribution, etc., is essential. To achieve standardization requires central leadership and in our country that must be provided at the Federal government level. The use of commonly understood terminology in each data field is also quite important. Clear definitions, both of the content and the use of the data are essential. Much good work is being done in this area both by the public and private sector, but it is only fair to say that much more remains to be done.

Let us consider for a moment the principal media that is currently available for the distribution of information. First, I would list publications and newspapers; second, the radio and television; third, the automated files that can be shared either by duplication or through computer systems; and last, the wide variety of reference materials available in many locations.

It is apparent that we do not lack the means of distribution, but it is equally apparent that we are not using these means in the most effective manner. I know this is a dangerous point to allude to, but we are not managing effectively the distribution of information.

There exists, to a large extent, duplication and overlap in the gathering, processing and distributing of information. In the Federal government we have attempted for several decades to eliminate this duplication and overlap by the bureaucratic issuance of directives from on-high which say "Thou shalt not duplicate." These directives have not accomplished their mission, but we have discovered that you can cut down on dupliation and overlap in these areas by letting a large number of people know that the duplication and overlap exists. Most of us re-invent wheels without even knowing we are doing so, because we lack the knowledge that someone else has done or is doing the same thing. The spread of knowledge of the existence of duplication and overlap to middle and top level managers will usually cause them to take an active interest in preventing the waste of valuable technicians' time on such projects.

I mentioned before that we now have computers. Some of these computers are so large and have such sophisticated software that it is now possible for a wide variety of information users to be serviced by one center. Also through some degree of standardization in the computer and telecommunications field, most of these computers can communicate with each other over great distances at high rates of speed. The point here is that this tends to either eliminate duplication and overlap or call it to the attention of both managers and general users.

Simultaneously, we have developed our technology at a phenominal rate and have also increased the scope and content of virtually all of our data files. This is particularly true in the general field of ecology. In other words, the multiplicity of our data has increased in direct ratio to the vastly increased complexity of our technology. This may be because rapid technological advances have by their very nature created huge arrays of data in the physical arena. We must sadly recognize, however, that this is not true in the human resources development arena.

There are many problems that we face when we consider setting up and operating an information center. First and foremost among these, I think, is the people problem. This concerns both the desire of managers for ownership of all they survey and the fear of individuals that their privacy may be invaded. We have known for at least ten years that it was not practical or logical for each small organization to have its own computer. It is even questionable today as to whether it is feasible and rational for large organizations to own and operate their own computer. We have demonstrated over and over the line managers in parochial fields of endeavor (industry, business and government) do poorly in the handling of computer installations. This has resulted in maintaining a high unit cost for handling data and in failure to a large extent to take advantage of the tremendous capability of these large computer systems.

The other major problem in setting up and operating a computer center is the provision of adequate financing. This need or problem must be faced up to at the outset or the operation will surely fail.

Several matters should be taken into consideration before a decision is made to establish an information center. The most obvious of these is to outline and get acceptance of the goals for which the center is to be established. Whether or not it should be a public center or a commercial operation should be considered. Along with financial support consideration should be given to making a thorough analysis of the method of charging for the products produced or of distributing the cost among the users. It is always a grave mistake to assume that each potential user is willing and able to pay a fair price for information products or services. The policy regarding these various methods of distribution and financial reimbursement is the very key to the success of the center and should be determined at the time the center is planned.

There are many ways to set up and operate an information center. Due to the limitation of time, I will not today go into detail regarding these alternatives. Rather I would like to leave with you my thoughts on some guidelines which I recommend to you and then discuss briefly our experience at OEO. First, be specific about the things you want to accomplish. Start with both a short and a long range plan. Keep these plans up-dated at very frequent intervals. Arrange adequate financing. Keep SERVICE the name of the game. Most people and most organizations will pay a premium for good service but they dislike paying anything for poor service. Make certain that your income or other financial support is adequate to keep this standard of service high. Be sure you know your clientele and that they know what you are doing. Provide for a first class public relations effort; in other words keep your best foot forward at all times. Start small and control growth of the center, always letting demonstrated need lead expansion. Now one final word of caution, do not let technical matters and technical difficulties occupy a disproportionate amount of your attention. People problems deserve most of your attention and will cause you the greatest difficulty if you do not address them promptly and aggressively.

In summary, it isn't easy.

Now, let me tell you briefly about our OEO experience.

OEO's founders foresaw a need for a data gathering and handling capability. They wrote a provision for an Information Center into the Economic Opportunity Act of 1964 and began implementation as one of the first steps in setting up the organization.

To get off to a fast start, we picked up two surplus computers from another agency and engaged a contractor to perform the systems design and programming. We later, in 1966, added two more surplus computers identical to the first two to give us more processing capability. We had two immediate goals: 1) to get a handle on where federal money designated by Congress to aid the poor and disadvantaged was going by locality and just what it was being used for, and 2) to set up adequate records on what OEO was doing in-house for both operational control and analysis.

Again, our founders had the foresight to get authority to require the other federal agencies to provide us with the information regarding their activities in the general poverty arena. We published a catalog of federal assistance programs in 1966 and also produced a report of the outlays of federal funds through those programs, by county and city. This was the first time the federal government had produced a consolidated picture of their efforts in the "help-the-people" area.

Also, in 1966 we engaged another contractor with experience in data gathering and processing to build a community profile that we hoped would gauge the well-being or lack of well-being in each community and thereby aid us in identifying need for assistance. We used over 300 series of data and printed 200 sets of these for every county in the U.S.

Now, back to the method we chose for operation of our center. In addition to the computer-oriented functions I've mentioned, we early-on developed a capability for dissemination of information to both officialdom and the general public. This was comprised of four groups: 1) Statistical or number massagers, 2) Correspondence clerks, 3) General clerks and 4) Librarians. These four groups were placed under one manager who coordinated their activities and reported to the Head of the Center. Development of this in-house delivery ability was, I think, the most important step we took in building the center.

Now to our OEO experience after 1966. In 1967 our three most visable products, the Community Profiles, the Catalog of Federal Domestic Assistance, and the Federal Outlay Reports came to the attention of the state governors, a number of Congressmen, and the President. The President instructed the Director of the Bureau of the Budget and the Director of OEO to set the Catalog and the Outlays Reports up on an expanded and more permanent basis. B.O.B. issued Circulars A-84 and A-89 instructing all Federal Departments and Agencies to report the necessary data to OEO each year. Beginning with 1967 OEO published large numbers of these documents each year. In 1971 we transferred the Catalog function to OMB. We still publish annually the Federal Outlay Report. In 1971 we published a record of the Federal Grants made in FY 1970. OMB has also assumed the function of maintaining the Federal Grant File.

Let's look now at a couple of state activities among the many efforts state governments are making in the information arena. These are notable in that they are somewhat innovative and they are successful.

On July 1, 1970, the State of Minnesota consolidated control of Data Processing in one organization, the Department of Administration. For about 18 months thereafter they operated out of two locations. They are now in one location with two large modern computers and a consolidated staff. The significance of these moves is more than improving efficiency or saving funds. Just by putting state information services under one control they have largely caused a high degree of coordination to come about without strenuous effort. It is now much simpler for them to establish and maintain a state policy on information matters. For example, they pioneered the state position against dedication of computers for certain parochial uses. They have served other political entities within the state by providing them leadership and facilities.

Several other states have gone the same route as Minnesota. And the others are headed that direction. The States have an organization called the National Association for State Information Systems (NASIS), to which the chief information or data processing official in each state belongs, together with a number of state legislators. I suggest that the environmental people tie into that organization.

Another rather interesting development is beginning to evolve from the operation of the state clearinghouses that keep track of federal grants. A number of states are finding this mechanism useful in tracking environmental protection statements. California is developing an ability to coordinate intergovernmental activities in many fields at three levels of government. As a part of this effort they are gathering a great deal of specific data re ecology in 30,000 acre tracts. This should result in an excellent data base against which they can analyze each new proposed project. The cities, counties, regional planners, state and federal officials are beginning to get their thing together in California. The Office of the Governor is providing leadership. This looks like the beginning of a worthwhile information center.

I've used up my time and I thank you for yours.

John R. Totter, Director
Division of Biomedical and Environmental Research
U.S. Atomic Energy Commission

At this Symposium it is proposed that the speakers acquaint the audience, which is presumed to consist largely of users of environmental research information, with appropriate sources. It is hoped that potential users would have the opportunity to learn about a large number of such sources and thus greatly reduce the effort required to become familiar with research work going on concerning some particular aspect of the environment.

In this session, which has to do with data used by Federal agencies, I will discuss first one source, the Smithsonian Science Information Exchange, which is widely used by Government agencies with interests in biological research for storage and retrieval of scientific data including environmental or ecological research results.

Information in SIE which is most useful to, for example, people who manage research programs includes much that is also useful to portions of the general public. But much of the information will not be particularly relevant to problems which normally arise when, for example, someone is challenging a decision to place a power plant or dam in some particular location. One kind of material not presently available in most data centers including SIE, and which would be extremely useful in managing a research program, is that which might be found in a first-class comprehensive and critical subject review and which would be of necessity quite up-to-date. Incidentally, the Federal agencies handle this problem usually by such means as attempting to have a staff which can evaluate data; using consultants; convening panels of experts; commissioning studies made by contract with the National Academy of Sciences, educational institutions, foundations or private consulting firms.

The Science Information Exchange, originally limited to Biological Sciences, was set up by several Federal agencies in response to a desire to avoid duplication in research support and to keep all participating agencies aware of the total Federal support in all areas of interest to the agencies. Later the mission of the Exchange was broadened to include physical sciences and fiscal and management responsibilities for the exchange were transferred to the National Science Foundation. At the present time full responsibility for both budgeting and management rests with the Smithsonian Institution.

The AEC and many other Federal agencies provide the Exchange with a summary of each research proposal it funds. The research programs of AEC's large laboratories are broken down in convenient categories which are similarly described in short summaries. Each year these are collected and sent to the Exchange which then replaces the old summaries and thus keeps a "current" record of research in progress.

Anyone may obtain summaries from SIE for a fee. The summaries may be grouped according to subject or author, by supporting agency and in a variety of other ways. An example I have here is the latest summary of AEC's program in Environmental research.

The completeness of SIE's data file and its degree of currentness is dependent upon the agency's insistence that its investigators comply with a directive to provide the necessary information in the first place, including - for example - the 200 word summaries and to keep them up-to-date as the information changes. At the present time, we believe that AEC has information for more than 90% of its biological and environmental research program entered into the Exchange's data base.

It seems to me that the chief usefulness of this SIE data base to non-agency users would be that it might provide the names of people currently working in a field of interest. Thus one would be able to search other data bases for past researcy by the same scientists. In other words it would be a useful point of entry into the literature on a subject, but by no means would it furnish a comprehensive or authoritative summary of all of the work already accomplished in a given field. It's more nearly a "who's who" than a "what's what."

The SIE is very useful for certain types of internal AEC needs but does not lend itself to rapid comparisons of budgets in research fields for which other agencies have special requirements.

For many years the AEC has submitted information about its research and development programs to various Government agencies. Reports have been furnished to the National Science Foundation, Office of Management and Budget, the Office of Science and Technology, NIH, a number of executive departments, and Congressional committees. More recently, the public interest in problems of the environment has resulted in numerous requests from both public and private sources for information about the AEC's programs in this area.

While the AEC has been responsive to requests for information, each new inquiry usually required extensive clerical work. Therefore, consideration was given to the development of a new information system, designated the Research Projects Information System (RPIS), at Headquarters to provide a capability to respond to needs for information by the Commission, by Congressional committes, or executive agencies other than AEC.

The RPIS is designed to integrate contract, budget, financial and technical information on the Division of Biomedical and Environmental Research (DBER) program and the AEC environmental R&D program in one central data base.

The RPIS was developed to provide the AEC with centralized information on the environmental R&D programs of the AEC; to meet the need for maintaining an information file for various reporting requirements of the DBER; and to improve the management capability of the DBER, for example, by simply speeding up information retrieval.

The system was developed as a result of continuing requests for management information pertaining to the AEC-DBER programs. Further, the increasing interest in environmental effects intensified the need for similar information on the AEC's environmental research projects directed by other program divisions. The lack of an automated retrieval system and dependence on a manual record search resulted in delays in responding to management queries. The information in the RPIS will be stored to provide a basis for manipulating the information to produce combinations of output in report form to meet both internal and external requirements of the DBER and AEC. The scope of the RPIS will consist of the following:

1. Information concerning each environmental research project supported by the AEC.
2. Information concerning all other research projects supported by the DBER.
3. Information about each project to provide historical, current and projected data.
4. Two hundred-word summaries on each DBER project.

The basic information planned for storage in RPIS is already available at Headquarters. No new information is being created for the system. The advantages lie in the speed with which computers can assemble and transmit information for display on as many as several thousand research projects. Rapid and accurate compilation of information on research projects is expected to help in program analysis and management within DBER. We expect that RPIS will produce a variety of reports now prepared manually. These efforts require extensive staff input and clerical time.

A study of the data elements in the reports now produced manually revealed that most of the proposed report outputs required similar data elements and that some redundant information was being produced. Examples of the proposed major outputs are the following specific reports, by title:

1. Summaries of USAEC Environmental research and Development.
2. Research Contracts in the Life Sciences (Listing).
3. Contract Listing by State and/or Institution.
4. National Science Foundation Annual Report.
5. Medical Health Related Annual Report.
6. Budget and Financial Reports.

We feel the following accrued benefits will be derived from the DBER Research Projects Information System:

The economies which would be achieved by serving AEC users from a single system. For example, the Division of Biomedical and Environmental Research could retrieve environmental research project information pertaining to their program and the Division of Environmental Affairs could retrieve information concerning all AEC environmental research projects.

The ability to respond to management queries in an accurate and timely manner. For example, information on all AEC environmental research being conducted in a geographical area may be retrieved as easily as information pertaining to all research projects on thermal pollution of air.

The ability to update the project file and generate reports on an exception basis.

The production of management summaries as well as detailed reports on a scheduled or as-required basis.

To the extent practical and relevant, the RPIS will contain coded data from the Federal Information Processing Standards publications (FIPS). We are now using FIPS 5-1, States and Outlying Areas of the United States, and FIPS 6-1, Counties and County Equivalents of the States of the United States. In addition, data codes used by the National Science Foundation, National Institutes of Health, and the Office of Management and Budget will be incorporated within the RPIS data base for use in generating output requirements of those agencies. These steps facilitate the interchange of information on the DBER program within the AEC, its contractors, and between the AEC and other Federal agencies.

The usefulness, if any, of this system for the requirements of non-agency information seekers is not yet fully apparent. It is certainly true that it should permit AEC to answer more quickly and more accurately requests for information. However, a more direct employment by other users does not seem feasible at present.

Ramune Kubiliunas
Predicasts, Inc., Cleveland, Ohio

SURVEY OF NONGOVERNMENT PUBLICATIONS CONTAINING ENVIRONMENTAL INFORMATION OF USE TO MANAGERS AND PLANNERS

I. What type of information do managers and planners need

A. Which industries/companies are involved in environmental problems
B. How does the Government regulate these industries/companies and enforce environmental decisions
C. How do industries/companies face their environmental problems
D. Who are the major environmental control associations, services, and equipment companies

II. What are the sources for this information

A. General discussion of business information publications

B. Environmental information from non-environmentally centered publications

1. General business publications

General business publications, a few of which are listed below, provide broad, nontechnical information in the environmental area.Their features and news stories give good background information and usually an up-to -date analysis of current environmental activities.

Barrons
Business Week
Commercial and Financial Chronicle
Financial World
Fortune
Industry Week
Journal of Commerce
New York Times
U.S. News and World Report
Wall Street Journal

2. Government sources (covered by Mr. Shriner)

3. Industry and Trade Association publications

Industry and trade associations are a primary source for environmental information. Whether it be in chemicals, paper, metalworking or other, these associations report on the activities, problems, expenditures and results of their industry's pollution control efforts. This information is reported either in the news releases, bulletins or publications of the associations, or in special reports produced by the associations. While these publications cannot be properly classified as periodicals, many are published on a more or less regular basis. The following is a list of some key industry and trade groups that are currently providing environmental information.

American Chemical Society
American Iron and Steel Institute
American Institute of Chemical Engineers
American Paper Institute
American Petroleum Institute
Chemical Marketing Research Association
Industrial Gas Cleaning Institute
Institute of Scrap Iron and Steel
National Coal Association
Society of the Plastics Industry
Technical Assn of the Pulp & Paper Inds (TAPPI)

4. Trade magazines

The trade magazines of specific industries are key sources for technical as well as nontechnical environmental information. They report what is being done, where and how it is being done, who is doing it, and how much it is costing. The following are some key trade publications which report substantial environmental information on their industries.

Agriculture:
- Agricultural Chemicals
- Farm Chemicals and Croplife
- Feedstuffs

Mining & Minerals
- Coal Age
- Engineering & Mining Journal
- Oil & Gas Journal
- Rock Products

Paper:
- Boxboard Container
- Paperboard Packaging
- Paper Trade Journal
- Pulp and Paper

Chemicals:
- Chemical & Engineering News
- Chemical Marketing Reporter
- Chemical Week
- Modern Plastics
- Plastics World
- Rubber World

Metals & Metalworking:
- American Machinist
- American Metal Market
- Automotive News
- Electronic News
- Iron Age

5. Direct information from companies

Much information on what specific companies are doing in the environmental field can be obtained from the annual reports of the companies.The reports list how much is being spent and how much is planned to be spent on pollution control. Sometimes the reports also include long term environmental objectives and plans.

Speeches by company representatives also contain pertinent environmental information. In this area, the Wall Street Transcript is a good source of information. It reports the texts of speeches made before security and financial analysts, market planners and other such groups. Recently, many of these speeches have centered on the environmental problems of various industries.

Currently, many companies are producing brochures on environmental problems and solutions. For example, FMC has an excellent brochure on the different ways industries pollute and on what machinery and/or chemicals are needed to control this pollution. Esso Research & Engineering has a study of Markets for Air Pollution Measurementation, 1971-1980 which is available for only $3.00. These are only two examples. There are many more.

C. Environmental information from environmental sources

1. Environmental Associations

As with industry and trade associations, non-government environmental associations are primary key sources for environmental information. Much of the information they publish is highly technical, but many environmental groups provide management related information as well, particularly on a regional basis. Some key associations that publish bulletins and/or reports useful to managers and planners include:

Air Pollution Control Association
American Academy of Environmental Engineers
American Water Resources Association
American Water Works Association
Environmental Engineering Intersociety Board
Environmental Equipment Institute
Institute of Environmental Science
National Water Purification Foundation
National Center for Solid Waste Management
National Council for Air and Stream Improvement
National Pollution Control Foundation
Water Conditioning Association International
Water Conditioning Research Council
Water Conditioning Foundation
Water Equipment Wholesalers & Suppliers Assn
Water & Wastewater Equipment Manufacturers Assn
Water Pollution Control Federation

2. Environmental Journals

These journals, many of which are published by the associations mentioned above, provide a wealth of information for managers and planners. Most of these journals are highly technical; nevertheless, they do contain invaluable economic and marketing information. It is up to the user to determine the ones most suitable for him.

Air/Water Pollution Report
Air & Water News Weekly
Air Engineering
All Clear
American Water Works Association Journal
Atmospheric Report
Clean Water Report
Compost Science
Contamination Control

Environment
Environmental Science & Technology
Environmental Research
Environmental Technology & Economics
Ground Water
Ground Water Age
Industrial Water Engineering
Industrial Wastes
Natural Resources Journal
Oceanology
Pipe Progress
Pollution Equipment News
Pure Water
Reclamation Era
Scrap Age
Secondary Raw Materials
Sierra Club Bulletin
Solid Wastes Management
Waste Age
Waste Trade Journal
Water Conditioning
Water & Sewage Works
Water Research
Water Pollution
Water & Wastes Digest
Water & Pollution Control
Water & Wastes Engineering
Water Works & Waste Engineering

III. How can this information be retrieved

Concern for the envirnment surrounds every institution, industry, and company. The combined output of material concerning the environment is staggering and overwhelming. It is absolutely necessary that users utilize services that help discriminate and locate the specific information they need.

A. Indexing and Abstracting Services

These services provide compiled information from numerous identified sources. Information is arranged in a logical sequence. Since all sources are identified, original articles can then be easily retrieved. Some abstracting and indexing services environmental information users should find useful include:

Accession Bulletin of Solid Waste Information
Acoustics Abstracts
Air Pollution Abstracts
Applied Science & Technology Index

Biological & Agricultural Index
Business Periodicals Index
Chemical Abstracts
Chemical Market Abstracts
Conservation Directory
Engineering Index
F&S Index of Corporations & Industries
Output Systems
Pollution Abstracts
Waste Trade Directory
Water Resources Abstracts
Water Pollution Abstracts

B. Market Research Services

Some of the best handlers of environmental information are professional market research companies and divisions. These companies compile hundreds of bits of information, analyze this information, and produce concise, comprehensive reports on specific topics. For example, Mc-Graw-Hill 's Research Division publishes annually a Pollution Control Expenditures Survey by industry. Battelle has completed an EPA sponsored study for the National Association of Secondary Material Industries. And Predicasts,Inc. has recently published studies on Solid Waste Disposal, Water Treatment Chemicals, and Water Pollution Control Equipment. These reports are extremely valuable to any user who does not have access to sophisticated market research techniques or information retrieval systems, or who does not have the time necessary to compile such information. Other compaines producing market research reports include A.D. Little, Stanford Research, C.H. Kline, Spear & Staff, and Noyes Data.

NOTE:
My apologies to the numerous associations, journals , and services that counld not be covered by this report.

ENVIRONMENTAL INFORMATION: PUBLICATIONS FOR MANAGEMENT AND PLANNING

by Robert D. Shriner
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I recently received a letter which began as follows: "A recent 12-month survey of newspapers in the major cities of the United States indicated that the environment was the nation's number one domestic concern during 1971. As a reflection of this concern, published literature in the field of environmental studies is increasing at such a rapid pace that researchers, decision makers, and others in need of current information are faced with the dissemination crisis. No individual has time to examine all the journals that deal with environmental science--yet scientists, businessmen, teachers, students, and concerned citizens need to keep abreast of the current literature." The letter then continued with the announcement of a new periodical. . . whose objective would be to "provide immediate access to the tables of contents pages of approximately 300 current environmental journals."

In addition to this vast amount of periodical material, there are thousands of other publications--books, reports, monographs, etc.--produced by business firms, government agencies, educational institutions, and research laboratories.

The task which Ramuna Kubilanus and I have been assigned is to propose how one might approach this huge and rapidly growing body of publications in order to get information useful for management and planning activities. We have chosen to divide the assignment so that I will cover public sources, and she will cover private sources.

In April 1970, in preparation for the National Teach-In on the Crisis of the Environment, the Indiana University library prepared a special bibliography entitled "Man and His Environment: Selected Government Publications, 1950-1970". That bibliography and the outline which it followed have been of great use to me in identifying publications in the public sector. In general, it was organized by level of government and, for each level of government, by agency. I will do the same.

Figure 1 shows the major public sources of publications for management and planning. I will discuss each of these areas briefly. In the time we have available, it is simply not possible to cover all--or even one--of these areas with much depth. And even if I had a great deal more time, I'm not at all certain that anything short of a series of volumes would be truly adequate. Despite this handicap, I will try to provide you with a reasonably adequate perspective on the sources and types of publications available from the public sector.

One of the principal difficulties in discussing publications for management and planning is to decide just what sort of information is really required for management and planning. Clearly, good management and good planning require very specific bits of information, ranging from detailed information on specific technology to equally detailed socio-economic information. However, for purposes of this morning's discussion, I have assumed that we are talking about information which has been specially summarized and condensed to suit the time limitations and the need for perspective that are most keenly felt by managers and planners. At the same time, however, I will include some important statistical sources and publications which, while not originated to serve the needs of the environment, still provide information relevant to environmental problems.

FIGURE 1

MAJOR PUBLIC SOURCES OF PUBLICATIONS FOR MANAGEMENT AND PLANNING

U.S. Government

State and Local Governments

Associations of Governments

International and Governmental Organizations

FIGURE 2

BASIC FEDERAL PUBLICATIONS ON ENVIRONMENT

Environmental Quality - 1972, Annual report of the President and the Council on Environmental Quality (CEQ), August release. $1.75

The President's 1972 Environmental Program, CEQ, March release. $1.75

The Economic Impact of Pollution Control: A Summary of Recent Studies, CEQ with EPA and Department of Commerce, 1972. $2.50

Annual Report to the President and to The Council on Environmental Quality, Citizens' Advisory Committee on Environmental Quality, June release. $1.25

The Cost of Clean Water: Summary Report, EPA, Annual. $.50

The Economics of Clean Air, EPA, annual. $1.00

U.S. Government Agencies

Every cabinet level department in the federal government seems to have said something on the subject of the environment. In addition, Congress has published numerous hearings and reports dealing with the subject, as have many of the large independent agencies including the Environmental Protection Agency, the Tennessee Valley Authority, the Atomic Energy Commission, and quasi-governmental organizations such as the National Science Foundation, the Smithsonian Institution, plus many others. So, where do you start if you have a question or want to keep informed?

Let's begin with some basic publications that will in turn lead you to other more detailed publications. (See Figure 2) The President's Council on Environmental Quality prepares a number of reports that provide the perspective needed for management and planning. The most important of these is the Council's annual report, this year entitled Environmental Quality--1972. This state-of-the-nation's-environment report is sent to Congress by the President in August of each year. It contains information about all phases of the environment, its problems, and its management. In addition, in March of each year, the Council assembles the President's message on the environment and specific information on the President's proposals for that year in The President's 1972 Environmental Program.

In conjunction with EPA and the Department of Commerce, the Council has recently published The Economic Impact of Pollution Control: A Summary of Recent Studies. The Council is also the recipient of an annual report and policy recommendations to the Council and to the President that is prepared by the Citizens Advisory Committee on Environmental Quality. To the extent that its recommendations foreshadow future policy, the annual report of the advisory committee is useful especially for long-range planning.

The administrator of EPA prepares two reports annually for Congress which also contain a great deal of useful information. Although each annual report may run to several volumes including a lot of detailed information, there is typically a summary report which condenses this detailed information into a form that managers and planners will appreciate. Although the titles vary slightly from year to year, the usual titles are as shown in Figure 2: The Cost of Clean Water and The Economics of Clean Air.

All right, so much for the basic information. But how do we get beyond that to find the specific information needed from the mass of government issued publications? The keys are listed in Figure 3, Federal Guides to Publications.

For the convenience of those who would like to know which federal publications on a particular topic are still in print, the Government Printing Office publishes a series of price lists by subject. For the environmental field, the appropriate price list is PL 88-Ecology, which is available free from GPO.

To keep abreast of new publications issued by the federal government, you can ask GPO to send you its bi-weekly Selected U.S. Government Publications, which lists 120 new publications released by the federal government. If you want to know everything that GPO has published, you can subscribe to the Monthly Catalog of U.S. Government Publications, which costs $7.00 a year.

Many of the documents published by agencies of the federal government and their contractors are not handled by GPO, however. Most of these are instead collected and cataloged by the National Technical Information Service of the U.S. Department of Commerce. NTIS prepares a number of monthly and semi-monthly indexes and announcements to inform agencies and the general public of new publications and to provide a permanent record of the existence of

FIGURE 3

FEDERAL GUIDES TO PUBLICATIONS

Ecology - PL88, GPO, monthly price list of available publications by subject, free.

Selected U.S. Government Publications, GPO, bi-weekly listing of 120 new publications, free.

Monthly Catalog of U.S. Government Publications, GPO, monthly with December cumulation, $7.00/year.

Fast Announcement Service, NTIS/Commerce, announces new reports as received, $5.00/year/topic.

Government Reports Topical Announcements, NTIS/Commerce, semi-monthly, $7.50/year/topic.

Environmental Awareness Reading List, NTIS/Commerce, highlights current publications, semi-monthly, $16.00/year.

Government Reports Announcements, NTIS/Commerce, biweekly abstracts of scientific, technical, business, and economic reports, $52.50/year.

Government Reports Index, NTIS/Commerce, biweekly, $57.50/year. (GRA-GRI combination is $97.50/year.)

Air Pollution Abstracts, EPA, monthly, $1.50 each.

Selected Water Resources Abstracts, EPA, semi-monthly, $22.00/year.

Nuclear Science Abstracts, AEC, semi-monthly, $42.00/year.

Environmental Impact Statements, NTIS/Commerce, draft statements issued 90 days before proposed action by a federal agency, $22.50/year.

the reports cataloged. The Fast Announcement Service alerts its subscribers to new reports in specialized subject areas as soon as they are received by NTIS. Government Reports Topical Announcements does a similar job but is issued semi-monthly. These are priced at $5.00 and $7.50 a year, respectively.

NTIS also publishes semi-monthly an Environmental Awareness Reading List which highlights current publications. A subscription to that is $16.00 a year.

If you want to know everything that has been received by NTIS, two companion volumes entitled Government Reports Announcements and Government Reports Index, both issued bi-weekly, provide a complete listing of all scientific, technical, business, and economic reports. An annual subscription to the combination is less than $100.

In addition to these guides to federal literature, the U.S. government also prepares a number of environmentally-related subject matter guides to both public and privately generated publications. If you are interested in finding information in one of the subject areas they cover, you should consult Air Pollution Abstracts, Selected Water Resources Abstracts, or Nuclear Science Abstracts.

Finally, if you are interested in keeping abreast of the environmental impact statements which are issued 90 days before a proposed action by a federal agency, you can subscribe to receive all of them on a continuing basis from NTIS at a cost of $22.50 a year.

Since the availability of statistical information is generally of concern to managers and planners, Figure 4 lists a number of federal guides to statistics which may be useful to you. The first two publications, prepared by the Office of Management and Budget, describe the government's statistical services and give the names and telephone numbers of the

FIGURE 4

FEDERAL GUIDES TO STATISTICS

Statistical Services of the United States Government, OMB, $1.50.

Federal Statistical Directory, OMB, names and phone numbers agency by agency, $1.50.

Guide to Census Bureau Data Files and Special Tabulations, Census, $1.25.

Directory of Federal Statistics for Local Areas, Census, $1.00.

Directory of Federal Statistics for States, Census, $2.25.

Directory of Non-Federal Statistics for States and Local Areas, Census, $6.25.

players. In my opinion, these two publications costing $1.50 each are among the least known yet most valuable tools you can have when you are seeking statistical information from the federal government.

The Bureau of Census also publishes four important guides to statistics which you should be aware of.

Obviously, the publications which I have listed represent only the very tip of the iceberg of federal publications relating to the environment. However, I believe I have provided the threads which will enable you to track down the specific publications which may be best suited to your needs. Unfortunately, the short amount of time here forces me to overlook a large number of individual publications and all of the fine magazines and periodicals of individual agencies. The individual agencies will be glad to provide you with information about their newsletters and magazines, if you will write to them, however.

State and Local Governments

I hope no one here will be offended if I say candidly that the area of state and local governmental publications is, in contrast to federal publications, virtually an uncharted wilderness. There is no central catalog of the publications issued by individual agencies within individual states, counties, or municipalities. In most jurisdictions it is necessary to go to each individual agency to find out what publications it has issued.

At the state level, periodicals relating to the environment appear to be mostly of the recreational/conservational/esthetic orientation. Typical of these are Wyoming Wildlife, Outdoor Indiana, New York Conservationist, and Michigan's Conservation Volunteer.

The sort of information which is needed for management and planning--that is, information concerning regulations, legislation, economic and

FIGURE 5

LIKELY PUBLICATIONS SOURCES AT THE STATE LEVEL

STATE ENVIRONMENTAL AGENCIES (e.g., Air Pollution, Water, Natural Resources, Forestry, Industrial Hygiene, Public Health, Fish and Game, Parks and Recreation, Agriculture, etc.) - for research and planning reports, local area studies, agency activities and regulations, and agency-related information.

STATE PLANNING AND/OR DEVELOPMENT AGENCIES - for research and planning reports, feasibility and development reports, economic data.

STATE ATTORNEY GENERAL AND/OR SECRETARY OF STATE - for copies of state laws.

STATE PUBLIC WORKS AGENCIES (e.g., Highways and Roads, Waterways, Railroads, Ports and Harbors, Utilities, etc.) - for technical information and limited information on planned activities (they are typically secretive about plans.)

STATE LEGISLATIVE COUNCIL - for special studies aimed at evaluating existing or proposed legislative measures.

STATE LIBRARY - for any publication of a state agency (if you're lucky).

STATE OFFICES OF FEDERAL AGENCIES - for publications that deal wholly or partly with the state.

FIGURE 6

LIKELY PUBLICATIONS SOURCES AT THE LOCAL LEVEL

LOCAL OFFICES OF FEDERAL AGENCIES (e.g., Soil Conservation Service, Agricultural Conservation and Stabilization Office, etc.)

PLANNING AND ZONING AGENCIES

HEALTH AND ENVIRONMENTAL AGENCIES (e.g., Water and Sewer, Parks and Recreation, Air Pollution Control, Public Health, Housing and Community Development, etc.)

CITY AND COUNTY ATTORNEYS

technical studies, and similar information--can usually be found most efficiently by going to the particular agency which you believe might have caused such reports to be prepared. Although the organization of government varies widely among states, most states will have offices similar to those listed in Figure 5, which should be likely sources of publications of the sort needed for management and planning. The best bets are state environmental agencies, state planning and development agencies, and state attorney generals' or secretary of states' offices. In some states, the state legislative council can also be a fruitful source of information.

State public works agencies responsible for such things as highways, utilities, railroads, etc., produce large amounts of information for their internal use but are typically secretive about their future plans.

In some states, the state library may be a gold mine of publications produced by state agencies, particularly if state law requires all agencies to deposit copies of their publications with the state library. However, not all states give their state library this responsibility, and some state libraries with the responsibility are not really able to carry out the function successfully.

In general, the smaller the jurisdiction, the fewer the number of publications which are prepared for distribution. When the geographic area and populations of a jurisdiction are small, publications are usually less important as a means to communicate with the public than at the federal level where the jurisdiction extends over thousands of miles and more than 200 million people.

Reports prepared at the city and county level are often available only on limited distribution or for internal use since the number of people interested and affected by local affairs is less than at the state or national level. Figure 6 suggests some likely sources for information at the county and city level.

One additional source of information which is not listed in either Figures 5 or 6 is the National Technical Information Service which, as I mentioned earlier, collects reports prepared by federal agencies and its contractors, which includes states, counties, and cities.

There is also another possible source of guides to publications at the state and local level: associations of governments.

Associations of Governments

In recent years, associations of government have become increasingly important, both politically and as sources of publications intended to help their members deal with the problems they face. Figure 7 lists several of these organizations and some of their publications. Time and space do not permit a complete listing of the special studies and reports which these organizations have published, even though many of them are useful for management and planning at the state and local level. They can often provide guidance in seeking publications of individual states and local governments as well.

At the international level, similar associations of government also exist and they, too, publish numerous studies and reports dealing with environmental issues. Figure 8 lists the international governmental organizations cited in the bibliography prepared by the Indiana University library, to which I referred earlier. Each of these organizations publishes periodic listings of their publications.

FIGURE 7

SELECTED ASSOCIATIONS OF GOVERNMENTS AND THEIR PUBLICATIONS

COUNCIL OF STATE GOVERNMENTS

The Book of the States (general reference)
State Government - quarterly
State Government News - bi-weekly
Special studies and reports

NATIONAL LEAGUE OF CITIES/U.S. CONFERENCE OF MAYORS

Nation's Cities - monthly
Urban Affairs Abstracts - weekly ($200/year)
Index to Municipal League Publications - monthly ($40/year)
Special Studies and reports

NATIONAL ASSOCIATION OF COUNTIES

American County Magazine - monthly
County News - weekly newspaper
Special studies and reports

SOME OTHER ASSOCIATIONS

* INTERNATIONAL CITY MANAGEMENT ASSOCIATION
* NATIONAL ASSOCIATION OF REGIONAL COUNCILS
* FEDERATION OF ROCKY MOUNTAIN STATES

FIGURE 8

SELECTED INTERNATIONAL GOVERNMENTAL ORGANIZATIONS

Council of Europe

Organization for Economic Coöperation and Development

Pan American Union

U.N. - Economic and Social Affairs Department
  - Economic Commission for Europe
  - Food and Agriculture Organization
  - Industrial Development Organization
  - Education, Social, and Cultural Organization
  - World Health Organization
  - Conference proceedings

Conclusion

In these few minutes it is clearly impossible for me to detail the full breadth and depth of publications for management and planning available from public sources. Instead, I've tried to identify the principal sources at each level of government and to point in the direction one should proceed to obtain additional information from these major sources.

The range of information which is involved in that topic we call "environment" includes, literally, everything around us. From air pollution to zoology. It is this all-inclusive nature of environmental information that makes it so difficult to manage. And it is this difficulty and our desire to overcome it which has brought us here today. And, if I may say so, it is this difficulty which makes it necessary and important for a number of us to be in the business of organizing and distributing information, in order to help people like you work *smarter* as well as harder.

Comments of Dr. Leonard Lund
Senior Researcher, The Conference Board
for the
National Environmental Information Symposium
Cincinnati, Ohio - September 26, 1972

Publications: Management & Planning Panel

The link in the information chain that I am to forge relates to the publication of environmental information for management and planning and to a large degree are products of management and planning. Thus, one who must use this information generally synthesizes new information while using it to meet his own particular needs.

In discussing the information needs of management, and it is this aspect that should be covered first, we can tangentially note that the requirements for decision-making refers to public enterprise projects almost to a like degree as it does to private business - but in this instance we wish to relate primarily to the private sector.

The concern of industry in dealing with environmental matters has undergone significant growth in the past few years. What we began with was the concern of a few forward looking "socially responsible" companies for the local environment they were contaminating with industrial pollution. They lessened the problem simply by installing some end-of-the-pipe mechanism for reducing the amount of pollution from their manufacturing process. The basic information needed at this point was engineering data on how to reduce the pollution and to a lesser extent some financial concept of what these devices would cost. Because there were no required standards, any pollution control effort was a plus factor.

Circumstances, newly generated by legislative action, have been altered greatly in recent years and with them the demand for information. The demand of the new laws for specific levels of cleanliness of air and water has severely affected management's capacity to make the necessary decisions without extensive back-up information on the economic, legal, technical and social ramifications of each decision.

Moreover, the heightened concern for environmental matters and the understanding of the impact of this one issue on many other areas of corporate decision-making has shifted the seat of planning and management leadership on the pollution control issue from the line positions or technical divisions to the corporate executive suite.

It is no longer adequate to get a fast engineering make-up and a rough budget estimate as a means of determining the corporate investment in a pollution control program. Now the corporate decision requires such information as the legal requirements of several levels of governmental jurisdictions, including a variety of regulatory bodies, the economic feasibilities of alternative approaches to the problem, the short-range and long-range consequences of each alternative, the economic effect upon other corporate activities and priorities, the community and public relations effects, the total physical aspect of new construction, the relationship with suppliers and customers, the details of product life from design to disposal, and a collection of other involvements. In effect, we are concerned with enough information to develop a complete impact statement on major business decisions. These data are developed from both within the corporation and from external sources.

Because the data which is sought is overwhelmingly economic in character -- production costs, tax liabilities, changeover impacts, competitive price structures, share price effects, effluent quantities and treatment costs, etc., many corporations utilize the sources of economic information which they have previously used to support other decisions which were not environmentally oriented. Thus the management and economic consulting firms continue to be a principal source of information for management. More and more, however, precise information produced by professional scientific and engineering organizations -- the very detailed technical data --

is finding its way into the corporate decision-making mechanism through the organizational structure from below the top management level.

The information from the consulting firms is compiled on a contract basis for the individual company and tailored to its particular demands and needs. In addition, the information is confidential and unaccessable to other data seekers. Therefore, to most of us, the sources of management data from which a substantial number of corporations will make environmental decisions remain private and privileged -- produced by sources long used by management to deal with all sources of problems -- i.e. consulting firms which have expanded their standard operations to include the collection and analysis of environmental data.

Last week the Wall Street Journal carried a story about the growth in use of economic consultants to help businessmen see the future, both in terms of general economic conditions and in relation to specific consequences of their operations. Emphasis was upon the use of econometrics as a growing element in corporate decision-making. In the same issue, the "Heard on Wall Street" column commented on the slow-down of new orders for pollution control equipment. One securities analyst was quoted as saying that a reason for the condition was that customers of equipment would be unwilling to order until they can be sure of the standards they will have to meet -- and because they anticipated that the government would take an extended time in clarifying these standards, some plants may delay placing new orders for equipment. The latter decision on the part of this management was based upon a prevalent impression of the time-span necessary for government action. However, an enlightened corporation would be aware of the current state-of-mind of the governmental decision-makers and would be governed by long-range estimates of the later cost of installing equipment. In other words, some companies will delay and use any type of rationalizing to do so. Others will responsibly deal with their problem with the decision based upon available information on both long and short range estimates.

Some of the better known of these consulting firms are Stanford Research Institute, Battelle Institute, Arthur D. Little, and Chase Econometrics. Many of them have also done work for government and these studies are sometimes made available as public documents. A prime example is the work done by Chase Econometrics and some economic analysts contracted by them to produce the Report on the Economic Impact of Pollution Control for CEQ, EPA and NIPCC. They analyzed activities in 14 industries by compiling information from individual companies and applying the amalgam to the entire industry. The information produced in the published report is being used to determine corporate pollution expenditure policy in other companies now.

I don't want to leave the impression that all of the corporations rely on these private sources. Many have units within the corporation for developing similar decision-support information. Here the effort is based upon the propriety information from within the company and data from such other sources as may be available. These other sources include reports from government agencies, trade association compilations and data supplied by business research organizations like The Conference Board.

The Conference Board began to compile and publish data on corporate expenditures for environmental facilities in 1966 as an adjunct of an existing periodical series of quarterly reports on corporate capital appropriations.

Based upon the responses to the annual questionnaire -- these surveys reveal the amounts expended for capital purposes for pollution control equipment by a limited number of manufacturing companies. Presently the survey reviews the annual expenditure for a three-year period so comparision among the three years is possible. Also covered are the annual operating expenditures for these facilities, the research and development costs, and the growth in the number of plants installing equipment. The value of the annual survey is the indicator it provides on the growth of this expenditure in corporate activities. While there is no effort made to project these results to cover the entire industry outlays, the respondents to the surveys represent an ascertainable portion of the total industry involvement.

The premier value of these surveys lies in the veracity of the responses. Because The Conference Board guarantees confidentiality of the response and publishes only aggregate statistics, the industry respondents are most candid in providing data.

More important as information for management planning purposes is the current study under way on the organizational response to the need to provide policy and direction to environmental programs. A questionnaire for ascertaining the type of organization set-up, the role of various corporate officers in making policy, the content of that policy, and the interrelation with all other corporate activities has been completed by over 500 companies and the analysis of these responses will be available in several months.

This study is an expansion and up-dating of a study done several years ago which has been very influential in providing guidance to many companies in the formation and operation of pollution control sections in the company and in the creation of a policy point-of-view for the company. Because of the aforementioned changes in corporate treatment of environmental matters, this older study is now out-dated and the recent trends in policy-direction for these purposes requires new coverage. Aside from the publication of these data, The Conference Board provides for its Associates specific examples of existing organizational patterns so that companies interested in creating units can have the advantage of knowing what other businesses are doing in this field and how they have organized to get this done.

Other sources of statistics on corporate expenditures are provided by trade associations and special publications. While efforts have been made to try to reconcile some of these sources, the different patterns of collecting data and the suspected bias of some of them has made their value as counter-checks of our collected data impossible. Many company researchers have frankly stated that they are unable to provide accurate and comprehensive analyses of the economic commitment of industry, even on a year-by-year basis because of the lack of such data. Part of the problem is the absence of a standard for reporting this data, and another factor is the suspicion that truly accurate reporting is not being provided.

Finally, The Conference Board holds conferences and seminars -- so do other groups - the American Chemical Society, the Chemical Engineers and other professional groups. The proceedings, the papers, the distillation of thoughts in any form (now including video cassette presentations) are valuable sources of information for planning -- so are the one-to-one relationships developed by attendees at these conferences -- some of these are lasting and valuable in providing continuing interchange of information -- that's why some of you are here -- why I am here and why it has been a pleasure meeting with you.

DOCUMENT SERVICES AND REFERRAL ACTIVITIES IN INDUSTRY AND THE FEDERAL GOVERNMENT

Arthur S. Jenkins
Computer Sciences Corporation

I'm going to talk about some of the document services and referral activities available in industry and the Federal government. I'm going to take a very simplistic approach -- that is, how the manager or planner can use these services so that he can access the most useful available information to help make his go or no-go, build or tear down, buy or sell decision with minimum risk.

I know little (and care less) about the inner workings of most information systems and services. The reason I don't know is that I've been spoiled -- by librarians. All the companies that I have work for have had capable library staffs who took care of my requests for information with a minimum of fuss and feathers.

If you can utilize such a service, just unload your problem, stated as clearly and simply as possible, on your librarian and relax. But if you don't have this help, stick around and I'll go through some of the do-it-yourself routines in a few minutes.

A word about the great mass of environmental information which is lurking out there, somewhere.

Everybody at this Symposium has been talking about its shortcomings and the voids in it. How good data on the economics of pollution control do not exist; how the information is not kept current; how it can't satisfy the needs of the business world; how there is no good base for predicting future regulatory actions.

All of these things are true -- at least to some degree. But the manager/planner must do the best he can with what's available, so I'll concentrate on practical ways of getting to today's information -- be it good or bad.

Before we get down to specifics about the use of available services, indulge me as I blow off some user-oriented steam.

Very helpful to the manager/planner are those retrieval services which cut across scientific disciplines and other boundaries to identify all the sources pertinent to the solution of a given problem. For instance, a key factor in the choice of a wet scrubber or an after-burner to control an industrial emission problem is life cycle costs. In order to estimate these costs, technical, legal and economic information must be available to the decision-maker. It simplifies his task if most or all of the data he needs can be identified by and procured from a single source.

I do have preferences as to the format in which the information requested is delivered to me. If there is time I'd rather have parent documents available. Brief abstracts are suitable for identifying the documents you need but they cannot tell you the whole story. There seems to be a plot to substitute the longer informative abstract for the real thing in some areas. This always leaves the nagging thought that the condenser omitted the one fact that would really be valuable to me. I'd rather scan the original and do my own abstracting. Or if time is short, assign a sharp staff member who knows the situation to pull out pertinent facts.

I like my documents in hard copy form. Microfiche are just dandy if you happen to have a reader on your desk. Most managers don't. And, as many managers and planners do their catch-up reading and paper work at home at night, microforms of all kinds are often inconvenient.

The most important characteristics of an information service are scope of coverage, response time, currenty of information and that illusive aura of trust and dependability that is so important. Only time and repeated usage of a good service can build up that feeling that when they give you the word, you've got it all.

Cost of service is not a major factor to most managers and planners. An auditor may pick a nit once in a while when he checks the cost of an extensive search but the money spent for most information is readily justified.

Enough of these ramblings. Let's take a look at the referral services available.

Simply put, a referral service guides and directs a user to those people or places who have the answer to his question. It does not attempt to provide the answer or even to list a bibliography of documents on the subject. It does tell the user who can help him, where he can find specific information, what source can provide the data he needs, and how he can locate the information required. It identifies individuals or organizations with specialized knowledge of a given subject or discipline.

Almost everyone in the information business lists referral activities as one of the services provided to their users. Specialized libraries and services are usually happy to identify other information sources in their field. Government and industry systems are referrals to augment their coverage and assist their clients. But all of these referral activities pale before the size and reach of the National Referral Center, Science and Technology Division, Library of Congress.

The Center is, in their own words, "concerned with all fields of science and technology; the physical, biological, social and engineering sciences, and the many technical areas relating to them. Also, it is concerned with all kinds of information resources, wherever they exist: in government, in industry, and in the academic and professional world."

The sheer numbers describing the Center's operation are impressive. The Center has been in existence for ten years, has received 25,000 requests for information and presently receives 75 to 100 queries each week. Over thirty thousand organizational and individual potential information resources have been contacted and twenty thousand responses are on file. Over the years almost 12,000 sources have been listed, and about 8,500 are currently carried in the automated live data base. Four professional referral specialists, assisted by support personnel, manage to produce a response to most inquiries in three to five working days. In addition, the Center has compiled several publications under the general title. "A Directory of Information Resources in the United States" which are printouts of portions of the Center's data base. These documents may be purchased from the

Government Printing Office, but the referral service for individual requests is available without charge.

Beautiful statistics, but does it work? Yes, it does, and the better you ask your question, the more precise is the reply. The general question, "Where can I get information on solid wastes?" brings a preprinted list of 23 sources of information with a brief description of the activities and services of each. A more specific query, "What are sources of information on methods of tree stump and other forest waste disposal in land clearing operations", resulted in five recommended sources. The response was received nine days after the request was mailed, and a random check of two of the sources confirmed their ability to furnish specific, pertinent information.

The Center has a practice of follow-up to appraise the services received by the requestor. An evaluation of the information sources recommended is part of this appraisal which the requestor is asked to make about three months after his initial contact. The Center has a booth in the Exhibit area. Stop by and talk about your problems.

Other Federal and industry referral activities are available but none have the scope of the National Referral Center. However, there may be good reasons for utilizing their services. The world of classified information is a weird and wonderful merry-go-round. Fortunately, most environmental-related information, even that generated by the Department of Defense and its contractors, is not classified. Much of the unavailable material is in the Chemical-Biological Warfare area, but managers and planners can normally get along without detailed knowledge of line source diffusion models and defoiliant concentrations. If you must have access to the classified information and have the credentials, ask the Defense Documentation Center in Alexandria, Virginia, for help. In the very unlikely event they don't have the document you need, they know who does.

The best reason for asking smaller, more specialized libraries for referral services is that they are more likely to be able to put you in direct contact with a person who can solve your problems. Examples at the Federal level are EPA's Solid Wastes Information Retrieval System and the Air Pollution Technical Information Center and the Agriculture Department's National Agricultural Library. The Federal government is loaded with true, card-carrying experts on every subject imaginable and the specialty library services are usually happy to help you locate the one of your choice.

Professional societies also will assist in identifying their members who have recognized subject matter expertise. Many consulting agreements have resulted from this type of referral; in fact some consultants depend on such contacts for a substantial portion of their business.

One final referral activity should be mentioned. It is informal and appears on no listing of information services. It's the grapevine, or as some call it, the "invisible college". There's always somebody who knows a guy who knows a guy. Actually it's quite effective in many cases. A recommendation of a product of service by a peer the manager or planner respects carries more weight than almost any other testamonial. So much referral activity takes place on the informal grapevine that it must be recognized as a factor in any encompassing environmental information system.

Now to take a look at some document services available in industry and the Federal government.

A document service, straight-forwardly enough, is a source of documents and publications. The documents may be provided in a number of forms: original publications, reprints, paper copies, several varieties of microforms, magnetic tapes, and computer printouts. Most document services also publish periodic bulletins which publicize the documents available and can provide catalogs, bibliographies, translations, indices and abstracts which supplement the basic service. Many such services specialize in subject or discipline areas but a few of the large Federal systems can provide almost any document which could conceivably be of interest in a search for environmental information.

At the Federal level, you have to start with the Department of Commerce's National Technical Information Service (NTIS). It is the central source for the public sale of Government-sponsored research and development reports and other analyses prepared by Federal agencies and their contractors and grantees. This includes those Department of Defense documents which do not carry a security classification of confidential or higher.

Last year NTIS distributed more than 2.5 million documents and microfiche to the public. They have almost 700,000 titles listed and all are available for sale. They are currently filling about 8,000 orders a day. Any way you look at it, this is big business.

NTIS advertises its wares and services primarily through periodic publications of abstracts of Government reports. These publications are sent to subscribers on a weekly or semi-monthly frequency and may be ordered in a number of disciplines or technical fields. The agency is required by law to price its products for cost recovery so there is a charge for all documents and other services.

Two weekly abstracts of interest to this audience are "Environment Pollution and Control" and "Management Practice and Research". NTIS issues several other publications devoted to environmental subjects, so I suggest that you who are interested check their booth in the exhibit area for complete details on these and other available goodies. Incidentally, you don't need any special qualifications or Government contract status to use the National Technical Information Service.

The Government Printing Office also is a source of documents generated by Federal agencies. The GPO's primary mission is that of printing most of the billions of forms, reports, instructions and all the other pieces of paper so dear to the bureaucratic world. But GPO also sells some of the more interesting of these printings to the general public and so can be considered a document service. Documents may be procured by mail or from one of the retail outlets operated by GPO. Listings of some of the 25,000 titles in print, classified by subject matter, are provided without cost and the listing titled "Ecology" would be of interest here.

There is no overlap between the GPO service and the National Technical Information Service. Books and documents available from GPO cannot be obtained from NTIS. In general, NTIS handles reports generated in the course of Federally financed R&D programs of all kinds while most GPO documents are specifically written for public consumption.

Many managers and planners who are involved in environmental control problems first think, naturally enough, of the Environmental Protection Agency. Our hosts here, the agency was formed two years ago from elements of HEW, Interior, AEC and other Federal departments and has been actively waging a more-or-less successful fight against all forms of environmental pollution ever since.

There are at least three document services within EPA which are of potential interest to an involved manager or planner. Documents pertaining to the health aspects of pesticides can be obtained from the Division of Pesticide Community Studies in Chamblee, Georgia. The Solid Wastes Information Retrieval System (SWIRS) in Rockville, Maryland, and the Air Pollution Control Office in Raleigh-Durham provide document services in their specialty areas. Other EPA information systems are in operation but some, like STORET, the water quality technical data system, is not oriented to providing the type of documents normally useful to managers and planners.

As the scope and services of the various EPA information systems seem to be rather fluid, a central contact in Washington would seem desirable. So I started calling people in the Agency to identify this contact. I never could find anyone who would admit to having the responsibility to distribute all EPA documents. Most of the time I got the "why don't you call good old Charlie; this sounds like the thing his group should do" routine. It was not until I arrived here in Cincinnati yesterday that I found the answer.

As most of you know, the Federal Government has divided the nation into ten Federal regions. In each of these is an EPA Regional Library, staffed by competent people ready to locate and provide environmental subject matter documents in response to your requests. Try it -- it's just got to be better than running down the EPA Headquarters phone book.

Another large document service at the Federal level is NASA's Scientific and Technical Information Facility (STIF) in College Park, Maryland. Aerospace-related documents from many sources are available here and, in keeping with NASA's drive to show earthy benefits from spending dollars in space, material of value in environmental problem-solving is included.

There are other Federal level document services available -- too many to attempt to name and describe here. The best way to find what you need is to work through the National Referral Center and/or the National Technical Information Service mentioned previously. If neither of these services can help you, the odds are high that your quest for knowledge will go unrewarded.

These services concentrate on documents prepared by Federally funded activities. This constitutes a large part of the environmental-related information available today, especially in the scientific and technical areas. But there is still some room for others to operate. Among these are some commercial document services which can be of invaluable assistance to the manager/planner.

Typical of the better document services available from professional societies is that of the American Institute of Aeronautics and Astronautics. Copies of most technical papers and reports of interest to the aerospace community are available in paper copy or microfiche form. The managers and planners involved with the effects of aircraft noise in the environment, for instance, will quickly find a broad, accessible information base on the subject. Those interested in internal combustion engine emissions can receive similar document services from the Society of Automotive Engineers; the foundry manager contacts the American Society for Metals and so on. All societies mentioned are scientific and technically oriented, and they seem to be a bit more adept in the document services business than the non-technical groups.

The American Management Association can provide its members with microfiche of thousands of specialized management documents. Commercial firms such as Standard and Poor's Corporation sell tapes of business data but can hardly be called document services. Several commercial document services can supply reprints from a wide range of domestic and foreign publications. One of the largest, Institute for Scientific Information, has a booth downstairs and they can describe their service better than I can.

This has been a very brief, almost superficial review of some of the document services and referral activities in industry and the Federal Government which are available to assist managers and planners to solve environmental problems. I have just scratched the surface. But even this view should be sufficient to convey the feeling that there are a number of rather simple ways of getting directly to the person or place where the answer to your specific questions may be found, and that making one phone call or filling out one form can set in motion machinery which will deliver almost any known document to your doorstep.

MINNESOTA NATURAL RESOURCE INFORMATION SYSTEM

a presentation made at
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by

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MINNESOTA NATURAL RESOURCE INFORMATION SYSTEM

INTRODUCTION

AN EXPANDING AND MOBILE POPULATION HAS CREATED CHANGES IN OUR SOCIAL AND ECONOMIC STRUCTURES THAT ARE RESULTING IN MUCH GREATER AND MORE DIVERSE DEMANDS FOR SERVICES. THIS ACTION IS PLACING ADDITIONAL PRESSURES UPON OUR NATURAL RESOURCES AND RAISES QUESTIONS ABOUT OUR HISTORIC MANAGEMENT PRACTICES. IN SOME INSTANCES WE SEE FRAGMENTED AND UNCOORDINATED MANAGEMENT OF OUR AIR, LAND, AND WATER RESOURCES SERIOUSLY AFFECTING THE BALANCE OF OUR ENVIRONMENT.

THE MINNESOTA STATE PLANNING AGENCY STAFF RECOGNIZED THE NEED FOR A MORE COORDINATED AND UNIFORM PLAN TO GUIDE THE USE, MANAGEMENT, AND PROTECTION OF OUR NATURAL RESOURCES. IT WAS ALSO OBVIOUS THAT SUCH A GUIDE COULD ONLY BE DESIGNED IF ACCURATE, RELIABLE, AND CURRENT INFORMATION WERE AVAILABLE.

ONE OF THE MAJOR RESPONSIBILITIES OF THE PLANNING AGENCY IN MINNESOTA IS TO COORDINATE PLANNING BETWEEN STATE AGENCIES. THEREFORE, WHEN THE LEGISLATURE CREATED THE AGENCY, IT WAS ESTABLISHED IN THE GOVERNOR'S OFFICE AND WAS NOT GIVEN FUNCTIONAL RESPONSIBILITIES. AS IT BECAME MORE APPARENT THAT WISE DECISIONS NEEDED A VERY BROAD INFORMATION BASE. IT ALSO BECAME OBVIOUS THAT NO AGENCY HAD THAT RESPONSIBILITY EXCEPT THE PLANNING AGENCY.

THE NEED FOR A WELL ORGANIZED INFORMATION SYSTEM WAS SUPPORTED BY MOST STATE RESOURCE AGENCIES, BUT THE NECESSARY FINANCIAL SUPPORT WAS NOT AVAILABLE. THE FIRST TASK WAS TO DEFINE, AND THEN TEST, THE STRUCTURE OF A NATURAL RESOURCE INFORMATION SYSTEM.

HISTORY

AT THAT TIME, WORK ON AN INFORMATION SYSTEM FOR LAKESHORE DATA WAS BEING CONDUCTED AT THE UNIVERSITY OF MINNESOTA UNDER THE DIRECTION OF THE CENTER FOR URBAN AND REGIONAL AFFAIRS (CURA). A PROJECT CALLED THE LAKESHORE DEVELOPMENT STUDY HAD BEEN FUNDED BY THE MINNESOTA RESOURCES COMMISSION TO DETERMINE WHICH LAKES HAD THEIR SHORELINES DEVELOPED, HOW EXTENSIVELY THEY WERE DEVELOPED, AND WHERE THE DEVELOPMENT OCCURED ON THE LAKES. THIS WAS DESIGNED AS A PREDICTIVE

MODEL OF LAKESHORE DEVELOPMENT, BUT IT APPEARED THAT IT COULD ALSO SERVE AS A PILOT FOR A STATE RESOURCE SYSTEM.

THE RESEARCHERS NEEDED TO ACCURATELY LOCATE ALL OF THE LAKES IN THE STATE, AND WITH OVER 12,000 BASINS CONTAINING WATER, THIS WAS NO EASY TASK. THEY FIRST WENT TO THE DEPARTMENT OF NATURAL RESOURCES TO FIND THE SIZE, DEPTH, FISH TYPE, ETC. OF LAKES AND IN THE PROCESS FOUND TWO FILES OF INFORMATION ON LAKES THAT WERE NOT COMPATIBLE. WE ARE NOW BUILDING ONE. THE NEXT DATA ELEMENT SOUGHT WAS SOIL TYPE AND FOR THIS INFORMATION THEY WENT TO THE U.S. SOIL CONSERVATION SERVICE AND THE SOIL DEPARTMENT AT THE UNIVERSITY OF MINNESOTA. THEY FOUND AGRICULTURAL SOIL CLASSES AND MORE THAN 400 SOIL SERIES IDENTIFIED IN THE STATE, BUT NO CLASSES THAT COULD SERVE AS A DEVELOPMENT GUIDE. SOIL SCIENTISTS FROM THESE GROUPS WERE ASKED TO ASSIST IN THE ESTABLISHMENT OF SUCH CLASSES AND THE FOLLOWING SEVEN WERE SELECTED:

LOAMY SOILS
SANDY AND GRAVELLY SOILS
BEDROCK
BOULDERS-BEDROCK-SOIL
WET SOILS
CLAY SOILS
ALLUVIAL SOILS

THE STUDY TEAM THEN NEEDED INFORMATION ON THE EXISTING VEGETATION AND FOUND IT HAD TO BE COLLECTED FROM AIR PHOTOS. STUDENTS WERE HIRED AND TRAINED TO DO THIS JOB. OF COURSE, IT WAS STILL NECESSARY TO LOCATE EXISTING DEVELOPMENT AND THIS REQUIRED MANY TRIPS TO THE COUNTY ASSESSORS OFFICE IN ALL 87 COUNTIES. HERE, AGAIN, THERE WERE DIFFERENCES IN HOW THE DATA WAS COLLECTED. HOWEVER, THEY ALL USED 40 ACRE UNITS FOR LOCATING DEVELOPMENT AND THEIR RECORDS SHOWED WHEN IT HAD TAKEN PLACE.

THE DATA THAT WAS EVENTUALLY COLLECTED FROM THIS PROJECT INCLUDED THE FOLLOWING:

LAKE NUMBER
LOCATION OF 40 ON LAKE
SEASONAL AND PERMANENT STRUCTURES
TYPE AND DENSITY OF VEGETATION
AQUATIC VEGETATION
ON AND OFF-SHORE SLOPE
ACCESS TO ROADS
LATITUDE AND LONGITUDE (geographic location)
MCD CODE FROM 1960 U.S. CENSUS
OWNERSHIP (STATE,FEDERAL,LOCAL, OR PRIVATE)

THIS PROJECT DEMONSTRATED THE NEED TO INVOLVE DATA COLLECTORS AND MANAGERS IN EACH STEP IN A PROJECT OF THIS TYPE. IT ALSO EMPHASIZED THE NEED FOR STANDARDIZATI OF DATA AT ALL LEVELS.

A FEW ITEMS OF INTEREST THAT WERE FOUND:

- THE DIVISION OF LANDS AND FORESTRY OWNED 10 TIMES MORE POTENTIAL SPAWNING AREAS THAN THE DIVISION OF GAME AND FISH.
- THE HIGHWAY DEPARTMENT OWNED MORE SANDY BEACH AREA THAN THE DIVISION OF PARKS AND RECREATION.

MLMIS

USING THIS LAKESHORE DEVELOPMENT STUDY AS A GUIDE, THE PLANNING AGENCY DECIDED TO EXPAND THE PILOT TO COLLECT DATA ON ALL LANDS, NOT JUST LAKESHORE. THE PRIMARY OBJECTIVE WOULD BE TO IMPROVE THE ENVIRIONMENTAL OR RESOURCE USE DECISIONS OF PUBLIC OFFICIALS BY MAKING ALL DATA AVAILABLE NO MATTER WHAT THE SOURCE, BUT IN A VERY SELECTIVE MANNER. IT WOULD ALSO PROVIDE AN INTERDISCIPLINARY TOOL FOR RESEARCH AT THE UNIVERSITY LEVEL.

WE RECOGNIZED THE NEED TO STANDARDIZE THE DATA COLLECTION AND STORAGE AND THAT ONE OF THE KEYS TO THIS WAS THE COORDINATION BETWEEN THE VARIOUS DATA SOURCES. EVEN THEN WE DID NOT KNOW WHAT FORM THE SYSTEM WOULD TAKE. IT WAS DECIDED TO DESIGN A PILOT OF ONE MAJOR DATA ELEMENT FOR THE ENTIRE STATE AND WE SELECTED CURRENT LAND USE. WE ALSO DECIDED TO WORK WITH THE SAME TEAM AT THE UNIVERSITY THAT HAD PRODUCED THE LAKESHORE DEVELOPMENT STUDY.

WORK ON THE LAND USE PILOT BEGAN IN 1969 AND IT WAS TITLED THE MINNESOTA LAND MANAGEMENT INFORMATION SYSTEM (MLMIS). IT NOW SEEMS THAT THIS WILL SERVE AS THE BASIC RESOURCE MANAGEMENT INFORMATION SYSTEM FOR THE STATE.

THE LAND USE INFORMATION WAS OBTAINED THROUGH INTERPRETATION OF HIGH ALTITUDE AERIAL PHOTOGRAPHY. THE INITIAL PROBLEM WAS FUNDING AND SUPPORT WAS RECEIVED FROM THE STATE PLANNING AGENCY, DEPARTMENT OF HIGHWAYS, MINNESOTA RESOURCES COMMISSION, AND THE UPPER GREAT LAKES REGIONAL COMMISSION.

THE LAND USE MAP WAS PRODUCED TO DEMONSTRATE THE SYSTEM AND TO STIMULATE ENOUGH INTEREST TO OBTAIN ADEQUATE FINANCIAL SUPPORT TO DEVELOP A RESOURCE MANAGEMENT SYSTEM THAT WILL PROPERLY SERVE THE STATE AND ITS SUBDIVISIONS. OUR EXPERIENCE IN PRODUCING THE LAND USE MAP AND THE WORK OF THE UNIVERSITY ON LAKESHORE GAVE US CONFIDENCE THAT THE STATE AGENCIES WERE INTERESTED IN THIS WORK AND THEY WOULD COOPERATE IN THE PROGRAM.

A WORD ABOUT THE UNIT OF LAND THAT HAS BEEN SELECTED FOR THE SYSTEM. THE 40 ACRE UNIT OR GOVERNMENT LOT DATA CELL IS THE LAND UNIT THAT HAS BEEN USED THROUGHOUT THE STATE BY ALL LEVELS OF GOVERNMENT TO REPORT OWNERSHIP RESOURCE DATA. THE LAKESHORE STUDY CONTAINS 40,000 OF THESE CELLS AND HAS THE DATA I DISCUSSED EARLIER FOR EACH UNIT. THE STATE LAND USE INFORMATION SYSTEM HAS 1,365,000 FORTY-ACRE UNITS (OR GOVERNMENT LOTS) AND EACH HAS A COMPUTER PUNCH CARD CONTAINING THE FOLLOWING INFORMATION:

- PARCEL LOCATION
- CURRENT LAND USE
- WATER ORIENTATION
- MUNICIPALITY LATITUDE AND LONGITUDE

OTHER DATA THAT WILL BE PLACED IN THE SYSTEM AS FUNDING BECOMES AVAILABLE INCLUDE:

- DOMINANT SOIL TYPE
- MINERALS DATA
- INDUSTRIAL DEVELOPMENT
- RECREATION DEVELOPMENT
- PUBLIC CONTROLS
- SURFACE OWNERSHIP
- GEOLOGIC DATA
- SLOPE
- SURFACE WATER DATA
- GROUND WATER DATA

OTHER SYSTEMS

ANOTHER STATE SYSTEM THAT IS CLOSELY RELATED TO THE MINNESOTA LAND MANAGEMENT INFORMATION SYSTEMS (MLMIS) IS THE NATURAL RESOURCE INFORMATION SYSTEM (NARIS) IN ILLINOIS. NARIS IS MORE ADVANCED IN TECHNOLOGY THAN MLMIS, BUT IS OF A MUCH MORE LIMITED GEOGRAPHIC SCOPE CONTAINING INFORMATION FOR PORTIONS OF EIGHT COUNTIES IN NORTHEASTERN ILLINOIS.

THE SYSTEM IS ALSO BEING DEVELOPED AS A DECISION AID FOR USE BY PUBLIC AGENCIES AND PRIVATE CITIZENS. IT IS BEING DEVELOPED AT THE CENTER FOR ADVANCED COMPUTATION OF THE UNIVERSITY OF ILLINOIS.

THE NARIS DATA BASE CONTAINS NATURAL RESOURCE INFORMATION BASED ON 40-ACRE TRACTS OF LAND AND IS ACCESSIBLE BY A GEOGRAPHIC IDENTIFICATION LABEL.

TO DATE, EACH TRACT CONTAINS 15 CLASSES OF INFORMATION UNDER THE MAJOR HEADINGS OF GEOLOGY, LAND USE, FORESTRY, SOIL AND WATER:

GEOLOGY	1.	INTERPRETATION FOR WASTE DISPOSAL
	2.	INTERPRETATION FOR CONSTRUCTION
	3.	WATER RESOURCES
	4.	SAND AND GRAVEL RESOURCES
	5.	SURFICIAL DEPOSITS
LAND USE	6.	HUD CODES (HUD IS THE U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT)
	7.	NIPC CODES (NIPC IS THE NORTHEASTERN ILLINOIS PLANNING COMMISSION)
FORESTRY	8.	NATIVE WOODY VEGETATION
	9.	PLANTED WOODY VEGETATION
SOIL	10.	SCS SOIL CHARACTERISTICS (SCS IS THE U.S. DEPARTMENT OF AGRICULTURE - SOIL CONSERVATION SERVICE)
WATER	11.	WATERSHED
	12.	WELLS
	13.	PRESENT IMPOUNDMENTS
	14.	FUTURE IMPOUNDMENTS
	15.	STREAMS

EACH OF THESE 15 CLASSES IS, IN TURN, MADE UP OF DATA ELEMENTS. IN GENERAL, INFORMATION IS STORED WITHIN NARIS AT THREE LEVELS: CLASS, DATA ELEMENT, AND VALUE.

THE NARIS LANGUAGE CAN ALSO BE USED TO DISPLAY INFORMATION FROM CREATED REGIONS. ONCE A REGION HAS BEEN CREATED, THREE NARIS VERBS MAY BE USED TO DISPLAY INFORMATION ABOUT THE REGION:

CALCULATE - PERFORMS BASIC STATISTICAL TESTS ON SELECTED DATA WITHIN THE REGION.

TABULATE - LISTS THE TOTAL NATURAL RESOURCES OF A SELECTED REGION BY A SELECTED CLASS (OR BY ALL CLASSES) ON A TRACT-BY-TRACT BASIS.

MAP - PROVIDES THE SAME INFORMATION AS TABULATE BUT IN THE FORM OF A PICTURE OF MAP.

NARIS CAN ALSO BE USED TO MAXIMIZE OR MINIMIZE A DESIRED OBJECTIVE WITHIN A REGION BY USING THE "WEIGHTING FUNCTION." THE WEIGHTING FUNCTION ALLOWS THE USER TO SUBJECTIVELY ASSIGN NUMBERS THAT ACT AS WEIGHTS. THESE NUMBERS OR WEIGHTS REFLECT THE SUITABILITY OF ANY RESOURCE IN THE TRACT TO SATISFY SOME GIVEN OBJECTIVE.

BOTH OF THESE SYSTEMS ARE BEING DESIGNED SO THAT THE USER NEED NOT HAVE A DETAILED KNOWLEDGE OF COMPUTERS AND PROGRAMMING. THIS, I FEEL, IS ESSENTIAL IF WE ARE TO GET MAXIMUM USE AND RETURN FROM THE SYSTEMS.

ORGANIZATION

MOST RESOURCE MANAGERS IN MINNESOTA TODAY BELIEVE THAT INFORMATION IS A NECESSARY INPUT TO ANY RATIONAL DECISION MAKING PROCESS. THEY ALSO FEEL THAT BETTER INFORMATION WILL MAKE THAT PROCESS EVEN MORE EFFICIENT. THE CONCERN FOR CONSERVING OUR NATURAL RESOURCES HAS STIMULATED THIS INTEREST IN AN ORGANIZED AND SYSTEMITIZED METHOD OF COLLECTING AND DISSEMINATING RESOURCE DATA.

THE MLMIS IS BEING DESIGNED TO SERVE AS SUCH A DATA BASE AND POSSIBLY WILL PROVIDE A FILE MANAGEMENT SYSTEM. THIS WOULD PERMIT US TO ACCESS FILES MAINTAINED IN VARIOUS LOCATIONS THROUGHOUT THE STATE AND ALSO ENABLE THE FILE MANAGER TO CONTINUE TO ACCESS HIS MATERIAL AT LEAST AS WELL AS HE HAS IN THE PAST.

THERE ARE THREE MAJOR ELEMENTS THAT WOULD SEEM TO GOVERN ANY WORK RELATED TO LAND AND RESOURCE MANAGEMENT:

- A STANDARDIZED CODING SCHEME FOR ALL RESOURCE RELATED DATA.
- COMMUNICATION AND EXCHANGE BETWEEN ALL DATA COLLECTORS.
- STORAGE OF ALL DATA BY COLLECTORS IN MACHINE-READABLE FORM.

THIS SYSTEM WOULD ALSO ATTEMPT TO ACHIEVE:

- AN AUTOMATED SYSTEM OF DATA ENTRY FROM COLLECTION POINT.
- A PROCEDURE TO UPDATE DATA BASES FROM THE POINT OF ORIGINAL ENTRY.
- ACCESS BY USER TO COMMUNICATE WITH DATA BASES AND ABILITY TO MANIPULATE DATA IN A DIRECT ENGLISH FASHION.

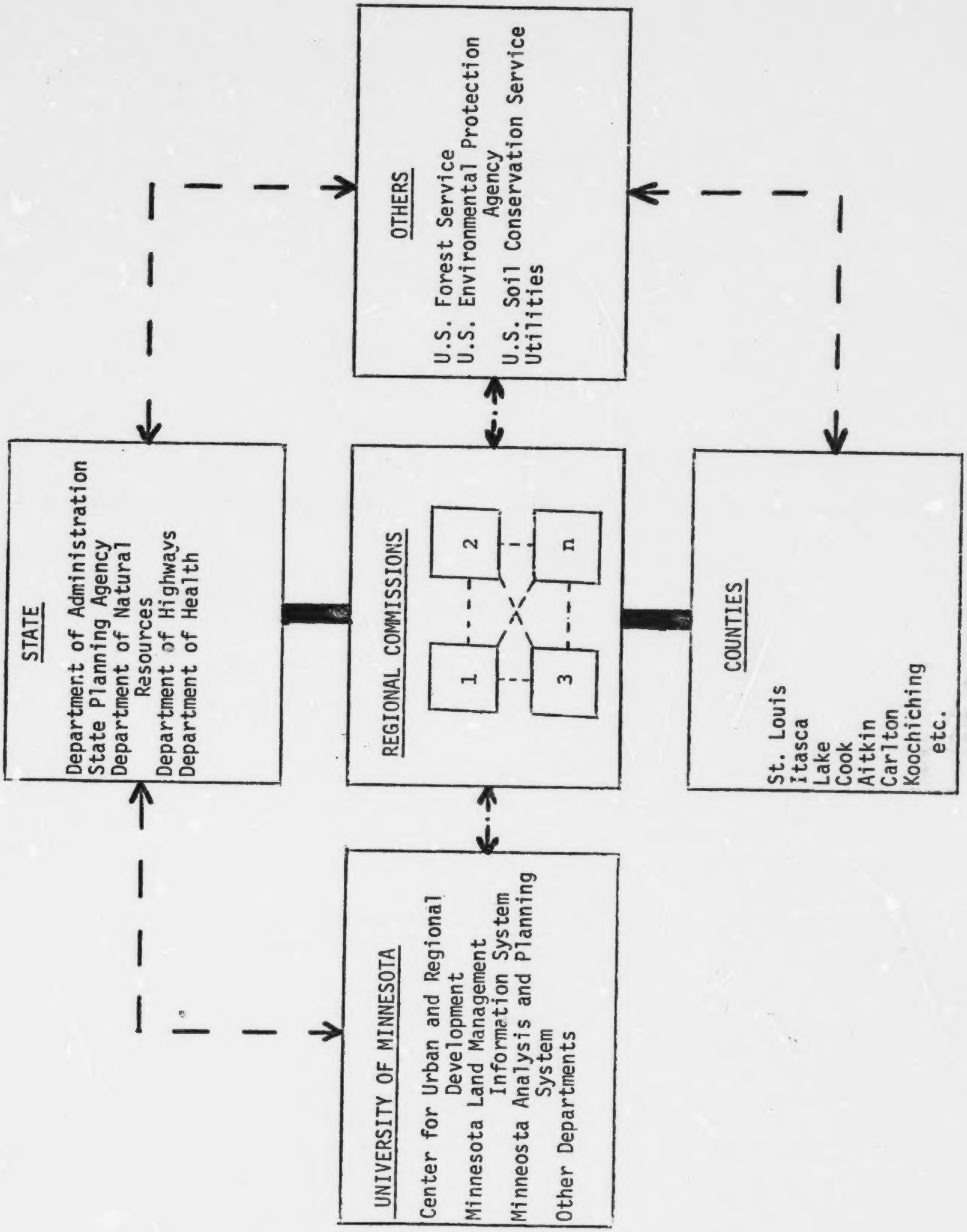
DISCUSSIONS ARE SCHEDULED TO BEGIN WITH THESE DATA COLLECTORS TO IDENTIFY WAYS TO AUTOMATE THE DYNAMIC PORTIONS OF THE DATA INPUT. TO ACCOMPLISH THIS, WE WILL INVOLVE THE FOLLOWING GROUPS:

STATE	REGIONAL COMMISSIONS	UNIV OF MINN	FEDERAL AGENCIES	PRIVATE SECTOR	COUNTIES
ADMIN	UGLRC	MLMIS	HUD	UTILITIES	RAMSEY
SPA	ARROWHEAD	UCC	EPA	BUS CORP	ST.LOUIS
DNR	MINN VALLEY	UCS	SCS		
PCA	METRO	MAPS	USGS		
HIGHWAYS		RAFT	NOAA		
HEALTH		FORESTRY	NASA		
MRC		GEOGRAPHY	HEW		
LEGISLATURE		GEOLOGY			
		LANDSCAPE ARCHITECTURE			
		SOILS			

IF WE WERE TO DIAGRAM HOW THIS WOULD BE ORGANIZED FOR EFFECTIVE INVOLVEMENT IT WOULD PROBABLY TAKE THE FORM OF THE DIAGRAM ON THE FOLLOWING PAGE.

THE STATE HERE PLAYS A MAJOR ROLE IN THE DEVELOPMENT OF THE SYSTEM, AND THE REGIONAL COMMISSIONS ARE MAJOR USERS OF THE DATA FOR PLANNING PURPOSES. THE COUNTIES AND THE FUNCTIONAL STATE AGENCIES CONTINUE TO BE RESPONSIBLE FOR THE OPERATION OF DATA FILES AND THE IMPLEMENTATION OF PROGRAMS AND PROJECTS.

ALTHOUGH THE PROGRAM IS NOW BEING OPERATED AT THE UNVIERSTIY, IT IS FELT THAT THE APPROPRIATE HOME FOR THE SYSTEM IS THE INFORMATION SYSTEMS DIVISION OF THE DEPARTMENT OF ADMINISTRATION. THEY ARE NOW PART OF THE TEAM THAT IS DESIGNING THE SYSTEM AND WILL GRADUALLY ASSUME OPERATIONAL RESPONSIBILITIES.


STATE
Department of Administration
State Planning Agency
Department of Natural Resources
Department of Highways
Department of Health
OTHERS
U.S. Forest Service
U.S. Environmental Protection Agency
U.S. Soil Conservation Service
Utilities
REGIONAL COMMISSIONS
1
2
3
n
COUNTIES
St. Louis
Itasca
Lake
Cook
Aitkin
Carlton
Koochiching
etc.
UNIVERSITY OF MINNESOTA
Center for Urban and Regional Development
Minnesota Land Management Information System
Minneosta Analysis and Planning System
Other Departments

THERE IS ADDITIONAL RESEARCH BEING CONDUCTED IN EXPERIMENTING WITH DIGITIZING, THE USE OF THE CATHODE RAY TUBE, PLOTTER MAPS AND ISOPLETH CONTOURING ON COUNTY MAPS. THESE TECHNIQUES SEEM TO HOLD GREAT PROMISE TO VASTLY IMPROVE THE DATA COLLECTION SYSTEM.

WE ARE ALSO WORKING WITH THE ERTS IMAGERY UNDER A CONTRACT WITH NASA IS AN ATTEMPT TO INTERPRET LAND USE AND LANDFORMS. WE HAVE BEEN DOING THIS WITH CONSIDERABLE ACCURACY USING OUR OWN HIGH ALTITUDE PHOTOGRAPHY IN PREPARING THE LAND USE INFORMATION AND WE HOPE TO BE ABLE TO MAKE SOME OF THE SAME INTERPRETATIONS WITH THE ERTS MATERIAL.

ANOTHER USE OF MLMIS IS THE DEVELOPMENT OF RESOURCE INFORMATION TO ASSIST IN THE PREPARATION OF MASTER PLANS. THE SCHOOL OF LANDSCAPE ARCHITECTURE AT THE UNIVERSITY OF MINNESOTA HAS BEEN PREPARING MASTER PLANS OF TWO PROPOSED STATE RECREATIONAL FACILITIES USING THE SYSTEM AND COLLECING ADDITIONAL DATA. FROM ALL INDICATIONS, THIS IS A VERY VALUABLE TOOL FOR RESOURCE EVALUATION AND ITS USE SHOULD EXPAND IN THE FUTURE.

SUMMARY

WE DO NOT FEEL THAT WE HAVE A FINISHED INFORMATION SYSTEM, BUT WE HAVE TAKEN A SIGNIFICANT FIRST STEP AND DEMONSTRATED THE VALUE OF A RESOURCE INFORMATION SYSTEM TO THE STATE. WE WILL CONTINUE TO DEVELOP THE MANAGEMENT SYSTEM AND REFINE THE MANY SUB-SYSTEMS THAT NOW CONTAIN AND PROBABLY WILL CONTINUE TO CONTAIN THE MAJORTIY OF THE DATA.

IT IS OUR INTENTION TO WORK ON THAT PORTION OF THE SYSTEM THAT WILL ASSIST IN RESOLVING OUR MOST DIFFICULT ENVIRONMENTAL DECISIONS AS WE EXPAND TO SERVICE ALL POSSIBLE USERS. THE SEVERAL PILOT STUDIES PREPARING MASTER PLANS SHOULD BE MOST HELPFUL IN THIS AREA.

FINALLY, WE ARE ANXIOUS TO DISCUSS OUR WORK WITH OTHER RESOURCE DATA MANAGERS IN THE HOPE THAT THE SYSTEM THAT FINALLY EMERGES IS A KEY MANAGEMENT TOOL TO ALL

USERS. WE ALSO FEEL THAT IT WILL BE HEAVILY USED IN THE PLANNING PROGRAMS REQUIRED IN THE NEW WATER QUALTIY LEGISLATION AND THE PROPOSED LAND PLANNING PROGRAM.

David L. Edgell, Deputy Director
Office of Actuarial & Research Services
UIS, Manpower Administration
U. S. Department of Labor

Environmental Information and Labor Market Problems: Today and Tomorrow

As Mr. Ruckelshaus mentioned this morning, there are over a dozen Governmental agencies engaged in the collection and dissemination of environmental information. One such agency is the U.S. Department of Labor. In keeping with the spirit of this symposium, and to the topic assigned me, I will confine my remarks this afternoon to some of the socio-economic information available, and needed, by the Labor Department in order to carry out its responsibilities for manpower planning under the National Environmental Policy Act. In this respect, I will briefly mention the Labor Department's dual role as both a user and producer of important socio-economic information. Unfortunately, the time allotted me does not allow for an opportunity to adequately cover very many of the environmental policy issues affecting the Labor Department in its collection and dissemination of information in this area. What I can do, however, is share with you what I think are some of the current highlights of informational needs for manpower planning by the Labor Department's Manpower Administration.

When President Nixon signed the National Environmental Policy Act on January 1, 1970, establishing the Council of Environmental Quality, he signaled a shift in national priorities whose consequences for the economy and for manpower requirements and training are, in some respects, just now being realized. In effect, the Act brought to the forefront urgent new claims on our economic resources such as an improved environment. The Act made it quite clear that while using our productive resources to produce the combination of goods and services most preferred by society, we may not be using resources in a way which best serves the national welfare. Quite rightly, then, the Government's role was, and is, continually being expanded to prevent overuse of environmental resources by the various sectors of the economy.

Before discussing some of the details of the Manpower Administration's activities in an effort toward gathering information for use in improving the quality of the environment, I wish to mention one piece of legislation currently on the horizon which could have important socio-economic environmental effects for the Manpower Administration's role in manpower planning. This legislation known as H.R. 16071, and which I have been informed passed the House of Representatives, would amend Section 9 of the Public Works and Economic Development Act of 1965 by adding "Title VIII - Environmental Effects." This addition, as I understand it, would involve the Environmental Protection Agency and the Labor Department in a cooperative venture to provide information and special types of economic assistance to persons losing jobs due to Federal standards for the improvement of environmental quality. In summary, the Secretary of Labor would be authorized to provide for (1) a special unemployment compensation program with unemployment insurance benefits to equal at least 60 percent of the individual's former weekly wage; (2) provide assistance on a temporary basis in the form of mortgage or rental payments; (3) provide reemployment assistance service; and (4) authorize payment of the actual reasonable moving expenses of individuals affected. To carry out such legislation there would be appropriated an amount not to exceed $100 million. While the impact of H.R. 16071 has not yet been fully analyzed, we can all think of additional types and kinds of information that would be needed to effectively carry out such legislation.

In exploring environmental protection activities as a possible source of jobs for unemployed and underemployed workers with different levels of skill, the Department of Labor has been severely hampered by the lack of data on occupational requirements. One of the first steps taken to collect this kind of labor market information was a manpower survey of municipal waste treatment plants. This survey was conducted jointly by the Labor Department's Manpower Administration and affiliated State employment security agencies, and the Environmental Protection Agency in June 1971. The data were collected from more than 90 percent of the 3,500 plants in a sample selected for this project. The sample, representing about 25 percent of all operating municipal waste treatment facilities, was stratified by size and type of treatment provided. Manpower data also were collected for plants not built at the time of the survey but anticipated to be in operation by 1975. Detailed breakouts of the survey data for individual States are still being made and a final survey report will not be available for some time. However, a preliminary analysis of the data has recently been completed on a nationwide basis. The following are the major findings of this analysis:

(a) Expenditures for municipal wastewater treatment plants are expected to triple in 3 years from $2 billion in 1970 to $6.1 billion in 1973, and then level off to $2.2 billion in 1975.[1] As a result of this heavy increase in new plant and equipment, employment in the Nation's municipal wastewater treatment plant facilities will increase substantially by 1975. (Employment at the time of the survey, June 1971, was 50,000.)

(b) This expansion will account for only part of the total manpower needs for such water pollution control activities. According to the preliminary survey data of the Manpower Administration and the Environmental Protection Agency, an aggregate total of almost 43,000 additional workers will be required to meet anticipated manpower needs in municipal wastewater treatment plants between 1970 and 1975. About one-third of these workers will be needed to operate new or expanded facilities, while the remainder will replace workers leaving existing waste treatment plant jobs because of such factors as deaths and retirements and transfers out of the industry.

(c) Seventeen thousand jobs, or 40 percent of the demand for additional employees, are projected to be for waste treatment plant operators--workers who operate wastewater treatment sludge processing, and disposal equipment to control the flow and processing of wastewater, sludge and effluent.

(d) Three out of every four open positions during the 1970-1975 period are expected to be in secondary waste treatment plants. The expansion of secondary facilities is being necessitated by more stringent water quality standards being adopted by States across the country.

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[1] The Environmental Protection Agency.

Another important project begun in 1971 and implemented in June 1972, and which again involves the Manpower Administration and affiliated State employment security agencies, and the Environmental Protection Agency, deals with "economic dislocation." The Secretary of Labor has signed a "Memorandum of Understanding" with the Administrator of the Environmental Protection Agency which provides for the establishment of an "Economic Dislocation Early Warning System." This action was taken in response to suggestions from the Council on Environmental Quality in recognition of the potential effects on employment of enforcement actions by Federal, State and local environmental protection agencies. The objective of the Department of Labor is to provide assistance to persons who become unemployed or dislocated as a result of actions taken to protect the environment.

The "Economic dislocation early warning system" will provide for a routine flow of information between the Department of Labor and the Environmental Protection Agency consisting of early notification to the Department of Labor by the Environmental Protection Agency of enforcement actions which could adversely affect employment opportunities. This will allow the Department of Labor to take prompt and appropriate action to avoid or minimize unemployment problems. The Department of Labor will, in turn, provide the Environmental Protection Agency with special kinds of information, including job data and mass layoff reports. Much of the information furnished to the Environmental Protection Agency will be forthcoming as a coordinated and cooperative effort by the Manpower Administration, and affiliated State employment security agencies.

Finally, and without belaboring the issue, I would like to describe one further effort being made by the Labor Department's Manpower Administration to obtain useful information needed for manpower planning requirements in environmental protection activities. Currently a survey is being conducted to determine the availability of job opportunities for calendar years 1972-1975 for professional and technical personnel in government and industry (both profit and nonprofit) in the fields of air, water, solid waste, pesticides, radiation, and noise control and protection.

It is anticipated that the available reservoirs of people trained and being trained in these occupational fields will not be sufficient to meet the longterm expected demand. However, the true extent of this demand is not known. At the same time, on the labor supply side, there is a serious unemployment problem among professional and technical personnel formerly connected with the aerospace industry and related industries. Reductions in expenditures by the Department of Defense, NASA and other agencies of government connected with the aerospace industry has significantly impacted the employment opportunities for professional and technical support personnel. Many such people now find themselves unemployed but lacking the skills needed to make the transition to the professional and technical job market in the area of environmental control and protection. The survey will hopefully develop information as to the wage structure, educational requirements, residence requirements, employment criteria and other pertinent information which will assist manpower agencies in determining the size and scope of the training, retraining and other programs needed to meet the immediate needs of the industry and the unemployed engineers and technicians.

The basic problem faced by manpower agencies in responding to this critical demand-supply situation is the identification of (1) the type and number of job opportunities that will be available within the immediate future; (2) the amount and type of training and retraining programs which will be needed; and (3) other obstacles, e.g., salaries, restrictive employment requirements, etc. To train or to "over-train" for non-existent positions or for positions that will not become available until some future period (5 to 8 years) is inefficient and non-responsive to the needs of those now unemployed. Therefore, it is imperative, at this point in time, that this survey be directed at the demand for professional and technical jobs immediately available within the next one to four years in the environmental protection field in order to structure training and other employment efforts that will be immediately responsive to the needs.

The above-mentioned activities are only a few samples of some of the kinds of socio-economic data needed for manpower planning, and methods currently being used to obtain the information. These kinds of informational surveys are just a beginning. Similar studies of employment requirements in other sectors involving environmental protection are urgently needed as well. The need for similar types of data is emerging and developing so rapidly that unless we properly plan for gathering and processing such information now, we may be faced with inefficient and costly methods for meeting such problems in the future.

So far, much of the information has been and is being collected by the State employment security agencies. These agencies have done a very outstanding job in obtaining the most accurate and timely labor market information available for meeting today's decisions. The coordinated effort and cooperative attitude exhibited by these agencies has certainly gained them much admiration and respect.

The more difficult problem is in obtaining information for tomorrow's decisions. The task is a big one and should not be limited to just people involved in socio-economic programs. It will take the collaboration of all of the many disciplines represented here today to help formulate an information system capable of answering future manpower needs for environmental quality. Furthermore, an information system for future decision making is likely to require the manpower technicians and analysts currently helping to collect the data to have a greater understanding of the principles and relationships of the natural sciences, engineering, and other disciplines. And, needless to say, the real success in obtaining the combinations of information needed will depend on a "spirit of coordination and cooperation" and interdisciplinary teamwork among all the users and producers of such data. It's not an easy job to coordinate all the kinds of information needed from numerous disciplines for manpower planning, but by such cooperative efforts as this symposium and related activities, the job can be done.

In closing let me optimistically suggest that a good socio-economic information system need not be just a dream. Certainly the money and resources to hire and train the staff to accomplish this important work are hard to come by. And it is true that the economic priorities for manpower information for environmental protection will largely depend on politico-economic demands as prescribed by legislative action and administrative direction. But the priorities for information for manpower planning are so essential in any assessment of environmental protection that proper attention to this problem will certainly be forthcoming.

APPLICATIONS OF SOCIO-ECONOMIC INFORMATION TO ENVIRONMENTAL RESEARCH AND PLANNING

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Many years ago I read a classic 19th century book by the English archaeologist Layard, *Discoveries in the Ruins of Ninevah and Babylon.*[1] More recently, I was delighted to find an excerpt from Layard's account cited in a book on research writing. The excerpt, quoted here, seems very appropriate for introducing some of the points we shall be considering during this symposium. The excerpt is a letter from a Turkish official to an Englishman who had, obviously, put some very troublesome questions to the official.

> My Illustrious Friend and Joy of My Liver!
>
> The thing you ask of me is both difficult and useless. Although I have passed all my days in this place, I have neither counted the houses nor have I inquired into the number of the inhabitants; and as to what one person loads on his mules and the other stows away in the bottom of his ship, that is no business of mine. But, above all, as to the previous history of this city, God only knows the amount of dirt and confusion that the infidels may have eaten before the coming of the sword of Islam. It were unprofitable for us to inquire into it. O my soul! O my lamb! Seek not after the things which concern thee not. Thou comest unto us and we welcomed thee. Go in peace.[2]

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[1] Austen H. Layard, *Discoveries in the Ruins of Nineveh and Babylon*, London, 1853, p. 663.

[2] Jacques Barzun and Henry F. Graff, *The Modern Researcher*, New York: Harcourt, Brace and World, 1957, p. 3.

The attitude of this 19th century Turkish official comes as a conceptual jolt to anyone who is aware of present administrative practices in Washington or any state capitol. No vital statistics! No data on industrial productivity, labor force, or economic indicators! No historical collation of data used for extrapolation and prediction! Having worked a few years ago with a 20th century Turkish administrator, I can state that now socio-economic information and data furnish grist for the mills of government in Turkey as well as in the United States.

The attitude of some of my environmentalist friends who see little or no reason to discuss socio-economic information resources in the context of attacking environmental problems hits me with a very similar conceptual jolt. One of my friends is an ecologist who has been studying the ecology of a small patch of grassland, paying particular attention to the field mouse population. He has gathered, over a period of years, a vast quantity of detailed information about the numbers of field mice, their food supplies, their relative population with respect to predators, birth and death rates under various conditions, and so on. Several weeks ago he asked me why the National Environmental Information Symposium was to include a section on socio-economic information.

Yet it seems very obvious that a great deal of the information on field mice mentioned above is perfectly analogous to the kinds of socio-economic information we are discussing at this meeting, and the relationships of analogous sets of such information to our understanding of environmental problems is very similar. Mice do not formulate statements about environmental problems such as crowding, overpopulation, or lack of resources; but in a sense, this is precisely what the ecologist has done. We can look at our physical environment, our institutions, our population and demographic characteristics, our use or movement of resources, and many other factors and formulate statements about our environmental problems very like those the ecologist makes about field mice in the area of grassland.

Unlike field mice, fortunately, we can consciously analyze our problems and try to modify our behavior or our institutions in order to solve or alleviate them. We can plan, and implement our plans. But in order to do such planning, or to administer effectively the implementation of plans to solve environmental problems, we must ask a great many questions about things that were anathema to our friend, the 19th century Turkish official.

The point I wish to emphasize here, in agreement with the philosophy of Professor L. K. Caldwell of Indiana University, is that most environmental problems are really problems of the man-environment relationship. Significantly, most federal legislation dealing with pollution and its control or abatement defines "pollution" as manmade contamination of the environment. Therefore, we are not trying by such specific legislation to control environmental damages arising from the vast impersonal processes of nature such as earthquakes, tidal waves, or volcanoes. Our environmental legislation is directed at bringing human activity into a balance with natural resources and processes such that the quality of life is improved.

Why have we individually, or as governmental agencies, or as business and industrial corporations--or as a society as a whole--so perturbed the balance of our environment that we must now devote a major portion of our energies and resources to restoring a suitable equilibrium? What kinds of policies, programs, penalties, incentives, etc can be addressed to human activities to improve their impacts upon the environment? Han can we choose among alternative paths for improving man-environment relationships? What will be side-effects--for good or for bad--on other human values and institutions, such as social justice and economic well-being?

I believe these and other related questions are of the first level of importance for anyone concerned with improving the quality of our environment. So far as I know, no one has yet supplied the final and definitive answers to any of them. But these questions do speak to knowledge and to facts. If we are to act rationally and well, we must raise such questions, and we must seek out the knowledge and facts that can help answer them.

To whom can we put such questions with some hope of getting a better response than the old Turk gave his English friend? One answer may be to go to an information retrieval center using computerized storage and retrieval techniques. Until very recently, I was the project director of the Environmental Systems Applications Center, an environmental information center associated with a scientific and technical information center, ARAC, at Indiana University. The design, output formats, and some of our experiences at ESAC may serve to illustrate one kind of information center which attempts to service a wide variety of information requests.

The sources of information for ARAC and ESAC, or their information inputs, are periodically updated files of abstracts of reports, papers, monographs, books, and other publications. Such abstract files are generated both by governmental and private sources. Examples of files produced by government agencies are the NASA STAR and IAA files covering U.S. and foreign publications in the aerospace fields; *U.S. Government Reports Announcements*, which deals with unclassified reports from the Department of Defense as well as reports from a number of other federal agencies; *Selected Water Resources Abstracts*, which is produced by the Department of Interior and deals with all phases of water quality management and water resources; *Air Pollution Abstracts*, produced by the Environmental Protection Agency, which covers all facets of air pollution and pollution control; and *Nuclear Sciences Abstracts*, produced by the Atomic Energy Commission, which deals with all unclassified reports on radiation and atomic energy. Examples of similar resources produced in the private sector include *Chemical Abstracts Condensates*, which provides world-wide coverage of the literature of chemistry and is produced by the American Chemical Society; *Pollution Abstracts*, which covers all facets of environmental pollution and pollution control; and *Engineering Index*, which provides world-wide coverage of engineering literature. These particular examples are cited because they are the most commonly used at ARAC and ESAC.

This kind of input may be called *conceptual information,* to distinguish it from another kind I shall call *data. Conceptual information* of this kind is an abstract or digest of the published literature. If we search a *Chemical Abstracts Condensates* tape in response to an information query, we are essentially providing a literature search, albeit using very sophisticated techniques.

Data input sources are quite different. An example would be the use of tapes available from the Census Bureau containing population data. A search of these tapes for a given inquiry would pull specific facts, such as the number of people of a specified sex and age group who live in some particular geographical region.

The output of information searches performed at ARAC and ESAC is almost exclusively of the *conceptual information*, or literature search type. If an information user needs to find out the nature and scope of the recent literature on a topic such as demographic trends in a selected area of the Midwest, ESAC might very well be able to assist him. If the topic requires some sort of correlation of demographic trends with regional transportation planning and water resources, then the odds are that ESAC will be able to provide a valuable service by rapidly surveying a very large number of literature citations, using an appropriate search strategy which will bring together the desired key terms.

The output format will be a bibliography of abstracts of the relevant literature generated by the search. Some of the major problems faced by EAAC or ARAC staff in conducting such a search should be noted.

These are:

1) The request for information must be as definite as possible, particularly if the question is of a complex type which requires integrating several sub-topics in the course of the search, or if the query would tend to pull a large number of citations with low relevance to the user's principal interest.

2) The relative quality of the literature cited in an information base is not guaranteed merely because it is there.

Both of the above problems are serious enough to require that considerable staff time be spent in analyzing the question or request, usually by discussing the request one or more times with the person who submitted it. It has also seemed necessary, with few exceptions, to have each search output *edited* by a staff member with some familiarity with the subject matter. An unedited search can present the user with such a large proportion of chaff to wheat that it is of little or no use. For example, ESAC received a request to survey sulfur dioxide as an air pollutant, and control devices and techniques for sulfur oxides pollution abatement. The initial search strategy quickly pulled several *thousand* references. Although the user had initially specified a comprehensive search, the final edited version containing some 300 abstracts was more appropriate to his needs.

With the possible exception of *Chemical Abstracts Condensates*, all the abstract information bases mentioned above contain a surprising amount of socio-economic information. Several information searches performed by ESAC will serve to illustrate this point.

I was involved with an ambitious research design project developed by the Argonne Universities Association, the Midwest Regional Environmental Systems Program. The purpose of the project was to design an environmental baseline evaluation and planning system for the Midwest region as a whole. The project was divided into a number of research components: water resources; land allocation studies; geology, ground water, and mineral resources; population structure; employment and income; energy production and use; food production and agricultural land use; transportation; waste management; synthesis and comprehensive modeling; and behavioral, social and institutional research. My component, the information storage and retrieval section, had the mission of providing information support services to the other components and planning a data management system for output of the project.

We were required to survey the support information needs of each of the research components. One of the most fascinating conclusions of this survey was that, without exception, each research component felt the need for one or more elements of socio-economic information. As an example, an information search performed in response to inquiries on water resource planning incorporated citations on public attitudes toward water resource planning, public attitudes toward bond issues to support water resource and recreation projects, population and demographic trends in the region, and socio-economic modeling techniques and models.

A survey of the ESAC information bases for the transportation component elicited references on the impacts of transportation development, including highway location, on tax bases and rates, land use development, the flow of goods and materials, industrial sitings, and consolidations of public school systems.

A conclusion to be drawn from this experience is that socio-economic information is indeed relevant to systematic study of environmental planning.

But having arrived at this conclusion, I should like to examine some of the blocks which tend to inhibit wider utilization of information resources, and which are in part due to the nature of services such as those developed at ESAC.

I believe that everyone in the information business agrees about some of the blocks to information use. The first big one is *habit*--people have not been trained to use and evaluate information services, and a request for information services from a computerized storage and retrieval system just doesn't fit the life style of most people today.

The second big block, in my experience, is connected with *false expectations* about what an information system, particularly one producing a *conceptual information* output like ESAC's, will do for the user. All too often, a potential user is told that a search on the information system will answer his question or solve his problem. This may be true, or not. It all depends how he expects to *use* the output. Let us assume that his inquiry was properly formulated, a good search strategy was developed, the information base contained some highly relevant material which was pulled, and the search output was well edited. The user then is provided with a set of highly relevant abstracts which speak to his problem area. *This does not solve his problem, unless all he wants is a bibliography to adorn his bookshelf.* I have been surprised by the number of people who do, in fact, seem to be satisfied in this way.

But the assimilation and application of information requires work, time, and the appropriate training and experience to understand and fit the information in whatever discipline or subject area the problem is concerned with. We have found the most satisfied users of ESAC services to be people, particularly in large industrial organizations or state agencies, who know before they submit an inquiry what the output will look like, and what they will have to do in order to mine useful information out of the information supplied.

A third block to the use of such information services is the general lack of *interpretative services.* This is a genuine problem area for two reasons. First, almost any environmental problem area turns out to be so complex--because the potential inputs to its analysis and resolution are likely to come from a wide range of disciplines--that no one person is likely to have strong training and experience in all the fields of knowledge related to all the facets of the problem. This is a problem which is, of course, common to almost all multidisciplinary fields. The result is that no one person, or even any small group of researchers, is likely to be capable of evaluating the substantative value and content of all the bits of information provided by a comprehensive information search on all the facets of any particular problem--and much less capable of discerning all the particular relationships between the bits of information. At ESAC and ARAC we have tried, as I indicated, to take a first cut at this problem by providing editorial services, but no information center has the staff or funding to do thorough screening and evaluation for multidisciplinary information. So far as information centers are concerned, then, this problem is probably best left to researchers who have requested the information.

The second aspect of this problem seems more serious in its potential political implications. This becomes evident when we consider the plight of the general public or of citizens' environmental groups who seek information about environmental problems. This was brought home to me some time ago as a result of an information search on the global dispersion, kinetics, and degradation mechanisms of chlorinated hydrocarbons (such as DDT) that ESAC had provided for a research group at M.I.T. Some time later, I received in the mail a request for a copy of this search from a garden club in Martinsville, Indiana.

Clearly, the members of the garden club had an interest in--and felt that they had a need to know--this information. Equally clearly, the format of the information search was totally unsuitable for their ready use and comprehension. As an information center, we had no funding for dealing with citizens' groups as information clients, nor for providing interpretative services. Of course, the garden club could have gone instead to an agricultural extension agent or to a biologist; and I found that they had already done so in the past. The members of the garden club felt that they now wanted, to the best of their ability, to look at the objective, documented facts in the literature on DDT.

I don't think I did a good job in trying to answer that request, or many others like it. In spite of the fact that we didn't have the funding, the personnel, or even the explicit mission to try to deal with it, that request has nagged at me ever since. I think I hardly need say that the crucial points that puzzled the garden club members after hearing conflicting presentations from a biologist and an agricultural extension agent required an input and evaluation of socio-economic information, as well as other kinds.

If these blocks to routinely seeking and applying information of the kinds that can be supplied by information and data centers are as serious and widespread as I think they are, perhaps most of us are not so unlike the old Turkish gentleman, after all.

SOCIO-ECONOMIC DATA FOR ENVIRONMENTAL MANAGEMENT

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Introduction

In reviewing the publications which address themselves to use in the area of socio-economic impact of environmental questions, it is necessary to realize that much remains to be accomplished. Though much has been published in the field, there are many data resource needs that remain to be documented in a form that may be utilized directly for investigation and planning. For this reason I have divided the publications into "direct" and "indirect" methods of use.

Those publications in the category of direct usage describe, in most cases, the relationships of economic activity to residual production and the resultant interrelationships of economic activity and the environment. Some of these sources further project future economic activities and residual productions, while including the impact of abatement of those residuals upon the economic mix. These sources have been organized into headings for both general reference and specific investigation. However, many of the direct usage documents only describe current activities of production and abatement and omit much of the broad range of material necessary for management projection for both long term and short term application to the environmental needs of today and the future. It is for this reason that I have compiled the second bibliography for indirect usage.

The term indirect is used in description of the second body of information as these publications are directed towards the scope of projected economic activities and not specifically to the environmental interaction of these activities. These materials have been organized into national and regional studies for both long term and short term forecasting. However, as the information contained in these publications is often a rather detailed description and projection of the production-consumption cycle of industry, the technologies of production being utilized, and the expected changes or modifications of those technologies, much insight can be gained, though indirectly, on the environmental impact of these economic activities. In essence, the indirect usage bibliography is an outline of the data base from which many of the direct usage publications were drawn. Though the materials included in this heading are more difficult to apply to casual use, by their technical nature they lend themselves to precise application in planning, projection and investigation.

All of the materials cited are expected to be readily available. An attempt has been made to list the cost of the documents and the addresses of the data services. The materials offered by the data services are often presented in an assortment of packages more suitable to a variety of subscribers and the services should be contacted individually for cost summaries.

If personal bias and predilections are displayed in the presentation, it is hoped that such are received with patience and forbearance.

I. Direct Usage Bibliography

Appraisal of Economic Impact of Pollution Control

In spite of the current emphasis and preoccupation with environmental affairs, the number of studies which analyze the impact of expenditures related to environmental impact on the U. S. economy are limited in number.

Perhaps the most comprehensive recent study on this aspect is Herzog and Ridker's report for the Commission on Population Growth and the American Future. A more detailed presentation of the same material is contained in L. Ayres and Gutmanis's input-output analysis, which is summarized in R. Ayres and Gutmanis's methodology.

An additional comprehensive albeit summary analysis of the cost of environmental quality is contained in Charles L. Schultze, *et al.*, annual analysis of the U. S. national priorities and the 1972 and 1973 budget.

A wide-scope and detailed analysis of the relationship between environmental and political issues is contained in Dr. Davies' book, *The Politics of Pollution*, which unfortunately is somewhat dated, particularly in view of recent legislation such as the 1971 Clean Water Act Amendments.

Fortunately Dr. Davies is currently engaged in updating this significant work and the new edition will include the detailed political analysis of the 1972 Clean Water Act Amendments as well as other pertinent material.

A comprehensive article prepared by Bower and Hearon on the paper industry is of particular interest because this study clearly presents with empirical data the evidence that controlling a specific pollutant may be accomplished only at the expense of another waste or residual being discharged into the environment. The report also contains significant empirical data on various discharges from this important sector.

The Council on Environmental Quality report on economic benefits and costs related to various water pollution abatement is significant in that this is the only current government document which indicates the steep increases in marginal costs as the pollution control is increased say from 85 to 95% and above. While unfortunately the document does not contain cost data for individual industries, it does provide an overall view of the large costs associated with high efficiencies of pollutant control.

The studies available on international impact of increasing pollution abatement expenditures and therefore increasing cost of production are very few. here in the U.S. as well as abroad. The exception is the Chase Econometric Associates' study which does provide preliminary and tentative information on possible effects on international trade due to expenditures associated with pollution control.

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Comprehensive Environmental Models

A number of rather inclusive environmental models have been designed and applied in the area of environmental management. Almost all of these are very costly and complex undertakings and will no doubt remain so due to the large numbers of variables which must be included for which most of the data requirements are not yet independently available. Perhaps the most comprehensive model to become available is prepared by Russell and Spofford, working at the Resources for the Future.

Dr. Cumberland's model, which uses input-output analysis as the basis for the environmental evaluation, has also been well received and implemented in several areas.

The work by Goodman and Dobbins in the modeling area also merits notice, as well as that undertaken by Loucks and Lynn.

In summary however, it can be stated that the comprehensive environmental modelling still remains very much in the realm of art instead of science and very few such models have been implemented with real data. The major problem area lies in the paucity of data as explained in detail by Russell and Spofford in their paper.

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Uncontrolled Air Pollution Emissions

A large number of reports are available which describe the air pollution emissions in extensive detail. Of particular importance are various reports prepared by the Environmental Protection Agency and its predecessor agencies which provide detailed data for each major air pollutant such as Carbon Monoxide, Hydrocarbons, Particulates, Sulfur and others. The best single compilation of emission factors is contained in a recently published study prepared by EPA, Compilation of Air Pollutant Emission Factors.

Furthermore, the HEW and EPA reports to the Congress on air quality, Control Techniques for Carbon Monoxide Emissions from Stationary Sources and Control Techniques for Particulate Air Pollutants, contain additionally useful information.

Unfortunately the above EPA report does not differentiate as a rule the emission coefficients with regard to the technologies employed in production nor relate the air pollution emissions to quality and type of raw materials used and/or end products produced. Because air pollution emissions per unit of output may vary drastically from source to source resulting from the above mentioned determinants it may be necessary to investigate air pollution emissions from industrial sources taking into account such factors as technology employed, raw materials used, end products produced and so forth. While specific literature on this subject is still lacking some of the reports enumerated above do provide information on this very important subject.

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Uncontrolled Water Pollution Emissions

As in the case of air residual emissions, a considerable amount of work has been undertaken in establishing water pollutant discharges from various economic activities. Also in the case of air pollutants, most of this work has been undertaken by EPA or its predecessor agencies. Particularly important in this area are the draft reports for various industrial waste profiles. Equally detailed are the Costs of Clean Water Series, Volume 2. A comprehensive summary of these can be found in the American Chemical Society's report, Cleaning Our Environment, the Chemical Basis for Action.

The Industrial Pollution Control Handbook provides a detailed statement on the waterborne pollution emissions from various industrial sources. As in the case of air pollution emissions, waterborne residuals are effected by factors such as technologies used in production, raw materials used and so forth. Fortunately the Industrial Waste Profile Series prepared by EPA for a number of industries does provide considerable required information to determine the water pollutants and differentiate these for most sectors of economy.

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Costs of Standard and Advanced Air Pollution Abatement Efficiencies

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Costs of Primary, Secondary and Tertiary Treatment of Waste Water

A series of ten studies recently prepared for the CEQ, EPA and the Department of Commerce by various consulting organizations contain the best cost data on specific industries such as steel making, cement manufacturing, and others. In addition to these 10 volumes, McGauhey's Engineering Management of Water Quality, published by McGraw-Hill, presents a detailed summary of treatment costs. Finally, Robert Smith's article in the Journal of Water Pollution Control Federation provides detailed costs calculations for all municipal waste water treatment processes.

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Changes in Technology, Subprocesses, Materials and End-Products.

Projections of pollution emissions and residuals and the costs of abatement, which are the basis for policy determination when selecting abatement strategies, are a complex matter not subject to straight line extension of current volumes. A detailed knowledge of each industry sector is required even when the sectors are highly disaggregated. Not only must the current state of the industry sector be examined but the future major technological changes expected in the industry must be known. However, major technological change is not the only important factor to these projections; the industrial cycle promotes constant and important changes in subprocesses, and products and raw materials which may have as large and important effect on pollution emission and residual generation as major technological changes. Therefore the data requirements are quite detailed. This information has never been offered in a comprehensive summary and the publications below are offered as a limited selection for exemplification of the wide range of information available.

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2) "A Second Generation for Plastic Paper", Business Week, April 15, 1972, p. 108.

3) Chemical Economics Handbook, Stanford Research Institute, 1967.

4) "Aluminum Firm Develops Pollution Process", News Flashes, Chemical Engineering, March 20, 1972, p. 57.

5) "General Motors is Looking Into Polyurethane Paints for Its New Cars", Chementator, Chemical Engineering, March 20, 1972.

6) "A Markedly Different Process for Producing High-Density Polyethelene", Chementator, Chemical Engineering, May 29, 1972.

7) "Another Process Has Been Developed For Recovering Hydrochloric Acid and Iron Oxide From Steel Mill Waste Pickling Liquor", Chemical and Engineering News, May 18, 1970, p. 32.

8) "Dry Paper Process Has Economic Benefits", Technology Concentrates, Chemical and Engineering News, August 23, 1971, p. 37.

9) "High-sulfur Coal May Be Usable in Power Plants", Chemical and Engineering News, August 28, 1972, p. 13.

10) "The Process Control Instrument Industry: Companies, Products, and Trends", Chemical and Engineering News, October 13, 1969, p. 33.

11) "Slurry Pipelines Meet Challenges", Chemical and Engineering News, August 23, 1971, p. 39.

12) "The U.S. Paint Industry Faces Up To Challenging New Technology", Chemical and Engineering News, December 22, 1969, p. 31.

13) "Acid Plants Face Acid Test", Chemical Week, September 1, 1971, p. 44.

14)"A Big Plant to Prove Out Direct-Reduction Copper Processes", Chemical Week, December 17, 1969.

15) "A Chemical Extraction Process for Getting Copper from Sulfide Ores", Chemical Week, July 15, 1970, p. 79.

16) "Clamping Down on Phenol Waste", Chemical Week, November 4, 1970, p. 60.

17) "Cyclic Intermediates", Chemical Week, July 28, 1971, p. 36.

18) "Hydrometallurgy: Copper's Solution for Pollution?" Chemical Week, May 17, 1972, p. 27.

19) "In-Line Blending Unravels Chemical Mixing Maze", Chemical Week, November 24, 1971, p. 35.

20) "Leaching Process Saves Acid", Chemical Week, February 10, 1971, p. 52.

21) "New Acid Route Gets the Test", Chemical Week, September 22, 1971, p. 67.

22) "A New Copper Smelting Process Will Become the Industry Standard", Chemical Week, November 24, 1971, p. 33.

23)"New Inks Cure Printers' Air Pollution Problems", Chemical Week, March 8, 1972, p. 44.

24)"Opportunities in Econology Turn Him On", Chemical Week, March 1, 1972.

25)"Soda Ash Makers Add To Their Diggings", Chemical Week, December 9, 1970, p. 32.

26)"Tight Seal for Gases", Chemical Week, October 7, 1970.

27)"Negative Air Pressure Conveying", Food Technology, February 1972, p. 37.

28)Minerals Yearbook, 1969, U.S. Department of the Interior.

29)National Coal Board, London, England,"Reduction of Atmospheric Pollution", Volume 1, Main Report, September 1971.

30)"Environment Protection Gets First Priority at Cherry Point", The Oil and Gas Journal, November 15, 1971, p. 162.

31)"Ranchers Progress Report", Ranchers Exploration and Development Corporation, March 17, 1972.

II. Indirect Usage Bibliography

1. NATIONAL ECONOMIC PROJECTIONS

In discussion of national economic forecasts it is necessary to distinguish between short run (quarterly and annual) and long run projections. In both cases it is appropriate to discuss the organization promulgating the projections simultaneous with the enumeration of the actual data sources, i.e., published reports, as all forecasts are regularly updated and revised.

Short Run Projections and Data Banks

National Bureau of Economic Research
261 Madison Avenue
New York, New York 10016

Since its institution in 1920, the National Bureau of Economic Research has worked to develop methods of quantitative economic analysis and to apply these methods to policy questions of national importance. Numerous bodies of statistical data developed at NBER have been adopted by the Federal Government and are now maintained by public agencies. The Gross National Product and National Income Accounts are now published by the Department of Commerce; leading, lagging, and coincident cyclical indicators used to help evaluate and forecast business conditions are published by the Commerce Department in its "Business Conditions Digest," and the statistical series on consumer credit kept by the Federal Reserve Board.

NBER data bank contains the following economic indications, as well as other related variables.

The Nation's Income, Expenditure, and Saving

Gross National Product or Expenditure

National Income

Sources of Personal Income

Disposition of Personal Income

Farm Income

Corporate Profits

Gross Private Domestic Investment

Expenditures for New Plant and Equipment

Status of the Labor Force

Selected Measures of Unemployment and Part-Time Employment

Unemployment Insurance Programs

Nonagricultural Employment

Weekly Hours of Work--Selected Industries

Average Hourly and Weekly Earnings--Selected Industries

Industrial Production

Production of Selected Manufactures

New Construction

New Housing Starts and Applications for Financing

Business Sales and Inventories--Total and Trade

Manufacturers' Shipments, Inventories, and New Orders

Merchandise Exports and Imports

U.S. Exports and Imports of Goods and Services

U.S. Balance of International Payments

Consumer Prices

Wholesale Prices

Money Stock

Selected Liquid Assets Held by the Public

Bank Loans, Investments, Debits, and Reserves

Consumer and Real Estate Credit

Bond Yields and Interest Rates

Common Stock Prices, Yield, and Earnings

Federal Budget Receipts, Expenditures, and Net Lending

Federal Budget Receipts by Source and Outlays by Function

Federal Sector, National Income Accounts Basis

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Data Resources Incorporated
92 Hayden Avenue
Lexington, Massachusetts 02173

Data Resources Incorporated (DRI) provide three basic data bases and projections:

1) Input/Output, GNP Demand Model
    8-Quarters and 10-Years
    79 Industries

2) Federal Reserve Board Production Indices
    8-Quarters and 10-Years
    41 Indices

3) Industry Income Statements
    8-Quarters and 10-Years
    25 Income Statements

Input/Output, GNP Demand Model

Current and Constant dollar GNP implications for the following 79 industries are generated through the 1963 Input/Output matrix by the DRI 8-quarter or 10-year models. These GNP implications are useful for developing estimates of industry and trade association data at a detailed level.

INDUSTRY

Livestock and livestock products

Other agricultural products

Forestry and fishery products

Agricultural, forestry and fishery

Iron and ferroalloy ores mining

Nonferrous metal ores mining

Coal mining

Crude petroleum and natural gas

Stone and clay mining and quarrying

Chemicals and fertilizer mineral mining

New construction

Maintenance and repair construction

Ordinance and accessories

Food and kindred products

Tobacco manufacturers

Broad and narrow fabrics, yarn and thread mills

Miscellaneous textile goods and floor covering

Apparel

Miscellaneous fabricated textile products

Lumber and wood products, except containers

Wooden containers

Household furniture

Other furniture and fixtures

Paper and allied products except containers and boxes

Paperboard containers and boxes

Printing and publishing

INDUSTRY - (CONTINUED)

Chemicals and selected chemical products

Plastics and synthetic materials

Drugs, cleaning and toilet preparations

Paints and allied products

Petroleum refining and related industries

Rubber and miscellaneous plastics products

Leather tanning and industrial leather products

Footwear and other leather products

Glass and glass products

Stone and clay products

Primary iron and steel manufacturing

Primary nonferrous metals manufacturing

Metal containers

Heating, plumbing, and fabricated structural metal products

Screw machine products, bolts, nuts, etc. and metal products

Other fabricated metal products

Engines and turbines

Farm machinery

Construction, mining, oil field machinery equipment

Materials handling machinery and equipment

Metal working machinery and equipment

Special industry machinery and equipment

General industrial machinery and equipment

Machine shop products

Office, computing and accounting machines

Service industry machines

INDUSTRY - (CONTINUED)

Electric transmission and distribution equipment and electrical industrial apparatus

Household appliances

Electric lighting and wiring equipment

Radio, television and communication equipment

Electronic components and accessories

Miscellaneous electrical machinery, equipment and supplies

Motor vehicles and equipment

Aircraft and parts

Other transportation equipment

Professional, scientific and controlling instruments and supplies

Optical, ophthalmic and photographic equipment and supplies

Miscellaneous manufacturing

Transportation and warehousing

Communications, except radio and television broadcasting

Radio and television broadcasting

Electric, gas, water and sanitary services

Wholesale and retail trade

Finance and insurance

Real estate and rental

Hotels and lodging places; personal and repair services, except automobile repair

Business services

Automobile repair and services

Amusements

Medical, educational services and nonprofit organizations

INDUSTRY - (CONTINUED)

Federal Government enterprises

State and local government enterprises

Gross imports of goods and services

FEDERAL RESERVE BOARD PRODUCTION INDICES

Federal Reserve Board production index estimates are generated in 41 areas, by both the DRI 8-quarter and 10-year models using the constant dollar GNP demand components weighted by the 1963 Input/Output coefficients and corrected for changing technological trends, capacity constraints, and other variables.

INDUSTRY	SIC CLASSIFICATION
All industries	
Coal	11 & 12
Oil and gas	13
Stone and earth mats.	14
Manufacturing	
Food and products	20
Tobacco products	21
Textile mill products	22
Knitting mills	225
Rugs and floor coverings	22
Yarns and fabrics	22
Apparel and products	23
Lumber and wood products	24
Wooden containers	244
Furniture and fixtures	25
Household furniture	251

INDUSTRY (Continued)	SIC CLASSIFICATION (Continued)
Manufacturing (Continued)	
Fixtures and office furniture	252
Paper and products	26
Shipping containers	2653
Printing and publishing	27
Chemicals and products	28
Plastics and synthetics	282
Petroleum and products	29
Rubber and misc. plastics	30
Leather and products	31
Stone clay and glass	32
Stone and clay	32SC
Glass	32G
Glass containers	3221
Primary iron and steel	331
Nonferrous metals	333
Fabricated metal products	34
Metal Cans	341
Machinery except electrical	35
Farm machinery and tractors	352
Metal working machinery	354
Electrical equipment & supplies	36
Motor vehicles and equipment	372
Aircraft and parts	371
Instruments	38
Utilities (including gov. elect.)	49

INDUSTRY INCOME STATEMENTS

Also using the current dollar GNP demand components weighted by the 1963 Input/Output coefficients, and corrected for changing technological trends, capacity constraints, and other variables, the DRI Model estimates sales, production, capacity utilization, profits before tax, taxes, profits after tax and dividends for the 25 industries listed below. These estimates are produced for both 8-quarters and 10-years.

INDUSTRY	SIC CLASSIFICATION
All industries	
Manufacturing	
Food and products	20
Tobacco manufacturers	21
Textile mill products	22
Apparel and products	23
Lumber and wood products	24
Furniture and fixtures	25
Paper and products	26
Chemicals and products	28
Basic Chemicals	281
Drugs	283
Petroleum and products	29
Rubber and misc. plastics	30
Leather and products	31
Stone clay and glass	32
Primary iron and steel	331
Nonferrous metals	333
Fabricated metal products	34

INDUSTRY (Continued)	SIC CLASSIFICATION (Continued)
Machinery except electrical	35
Electrical equipment and supplies	36
Motor vehicles and equipment	371
Aircraft and parts	372
Instruments	38
Class I L-H Railroads	4011
Telephone companies	481
Electric utilities	491

Chase Econometric Associates, Inc.
Philadelphia, Pennsylvania

Chase Econometric Associates (Chase) provide the following five data systems and projections:

United States Data Base

Regional and Special Purpose Data Bases

Macroeconomic Projectioning

Long-run Industry Forecasts

Short-run Industry Forecasts

UNITED STATES DATA BASE

The Chase Econometrics United States Data Base contains over 8500 economic time series on a monthly, quarterly, and/or annual basis.

The Chase United States Data Base includes virtually all of the standard economic time series published or made available by the Federal Government. At the macroeconomic level these include the complete national income and product accounts including detailed components of consumption, investment, foreign trade, and government expenditures and receipts;

monetary and banking statistics, including interest rates; employment and earnings data; and construction and housing starts statistics.

Annual series are available for all two digit industries for current dollar gross product originating, constant dollar gross product originating, implicit price deflator, index of output, employee compensation, net interest, capital consumption allowances, indirect business taxes, and profits.

Series at the two and three digit industry level in the manufacturing sector are available on a monthly or quarterly basis for total employment, production workers, hourly wage rate, hours worked per week, index of industrial production, wholesale prices, shipments, stocks of inventories, new orders, unfilled orders, index after taxes, dividends, retained earnings, depreciation, cash flow, inventories, total plant, property and equipment, stockholders' equity, return on stockholders' equity, investment in plant and equipment, first and second anticipations, index of capacity utilization, depreciation factor, rental cost of capital, output originating, wage bill for production and overhead workers, supplements for production and overhead workers, unit labor costs for production and overhead workers, and labor productivity indexes for production and overhead workers.

A four digit level manufacturing sector series are available for value of shipments in current and constant dollars, value added, investment in plant and equipment, total employment, production workers, manhours of production workers, price index of shipments, wage rates of production workers, and wage rates of overhead workers.

The Chase Econometrics United States Data Base also contains many series not available elsewhere which have been developed for use in their macro and industry models. These are a two digit level manufacturing industries series including quarterly gross product originating, capacity utilization, unit labor costs for production and overhead workers, and labor productivity for production and overhead workers. The industry capacity utilization indexes are estimated by the same general method that was developed for the aggregate index. Estimation of unit labor costs for production and overhead workers has included the development of new series for overhead wage rates and supplements in type of worker. Also available is a four digit industry level series for manufacturing which include, as well as the range of data available for two digit level series, wholesale price indexes for each industry. This enables us to calculate constant-dollar shipments, or volume, for all four digit industries. Again, these series are not presently available on any other data base facility.

The general series which are available in the Chase Econometrics United States Data Base are as follows:

- Industry - Annual

(a) The following series are available for all 76 two digit industries:

Current dollar gross product originating

Constant dollar gross product originating

Implicit price deflator

Index of output

Employee compensation

Net interest

Capital consumption allowances

Indirect business taxes

Profit-type income

(b) The following series are available for almost all of the four digit industries in the manufacturing sector (4000 series):

Value of shipments, current dollars

Value of shipments, constant dollars

Value added

Investment in plant and equipment

Total employment

Production workers

Man-hours of production workers

Price index of shipments

Wage rates of production workers

Wage rates of overhead workers

- Industry - Quarterly

The following series are available for all two digit manufacturing industries, plus autos and steel. All Quarterly Financial Report data are adjusted for both sample period drift and change in SIC classification.

Quarterly Financial Report

Sales

Profits before taxes

Corporate income taxes

Profits after taxes

Dividends

Retained earnings

Depreciation

Cash flow

Inventories

Total property, plant and equipment

Stockholders' equity

Return on stockholders' equity

Survey of Current Business

Investment in plant and equipment

First anticipations

Second anticipations

Calculated by Chase Econometrics

Index of capacity utilization

Depreciation factor

Rental cost of capital

Capital stock

Output originating

Wage bill, production workers

Wage bill, overhead workers

Supplements, production workers

Supplements, overhead workers

Unit labor costs, production workers

Unit labor costs, overhead workers

Labor productivity index, production workers

Labor productivity index, overhead workers

- Industry - Monthly

The next series are available for all two digit manufacturing industries, plus autos and steel. In addition, most of the Employment and Earnings data are available for two digit nonmanufacturing industries.

Employment and Earnings

Total employment

Production workers

Hourly wage rate

Hours worked per week

Survey of Current Business

Index of industrial production

Wholesale prices

Shipments

Stocks of inventories

New orders

Unfilled orders

Other

Index of stock prices

2. REGIONAL AND SPECIAL PURPOSE DATA BASES

The Chase staff has constructed and currently maintains several special purpose data bases which feature the same advantages of completeness, accuracy, and timeliness as the United States Data Base. These specialized data bases may be specific to a particular firm or trade organization or apply to an entire region of the country, such as the New England Regional Data Base for which Chase Econometrics and Rapidata share responsibility.

The series which are available in the New England Regional Data Base are as follows:

Total New England Region

Industrial production by two digit manufacturing industry

Business failures by one digit industry

Retail sales

Financial statistics

- Commercial and industrial loans at commercial banks
- Real estate loans at commercial banks
- U.S. Treasury security holdings at commercial banks
- Holdings of other bonds and stocks at commercial banks
- Mortgage loans outstanding at savings and loans
- Consumer installment credit
- Automobile paper
- Other consumer goods credit
- Home repair and modernization loans
- Personal loans
- Savings balance of savings and loans

Individual States

Employment and wages and salaries data are offered for the following industries: (* indicates wages & salaries only)

* Agriculture
Mining, total

  * Coal mining
  * Crude petroleum and natural gas

* Mining and quarrying
* Construction
Manufacturing, total

  * Durable manufacturing
  * Nondurable manufacturing

Individual States (continued)

- Transportation and utilities, total
  - Railroads
  - * Highway transportation
  - * Motor freight
  - * Other transportation
- * Communication and public utilities
- Wholesale and retail trade
- Finance, insurance, and real estate services, total
  - * Hotels
  - * Business and repairs
  - * Amusement and recreation
  - * Professional services

Government

- * Civilian
- * Military
- * State and local

* All other

Other personal income categories

- Gross personal income
- Income taxes
- Other labor income
- Proprietors' income - farm
- Proprietors' income - nonfarm
- Property income
- Transfer payments
- Contribution for social insurance

Financial Statistics

- Demand deposits
- Time and savings deposits
- Savings and club deposits
- Other time deposits
- Mutual savings bank
- Savings on deposit
- Real estate loans
- Deposits made by mutual savings banks
- Deposits withdrawn by mutual savings banks
- Member bank loans
- U.S. Treasury securities held
- Other securities held

Other Business Statistics

- New business incorporations
- Number of business failures
- Liabilities
- Total construction
- Residential building construction
- Nonresidential building construction
- Nonbuilding construction

Individual Region (also states)

Variables included

- Total nonagricultural employment
- Manufacturing employment
- Durable manufacturing employment
- Nondurable manufacturing employment
- Nonmanufacturing employment
- Hours worked per week
- Average hourly earnings
- Number of unemployed
- Percentage of unemployed
- Civilian labor force
- Bank debits

Regions (* selected series only)

- Boston
- Bridgeport
- * Brockton
- Burlington
- * Fall River
- Hartford
- * Lawrence-Haverhill
- * Lowell
- Manchester
- New Bedford
- New Britain
- New Haven
- Portland
- Providence
- Springfield
- Stamford
- Waterbury
- Worcester

Boston Area

Components of the consumer price index

Conventional mortgages at different interest rates (also available for the area outside Boston).

Individual Region (also states)

Variables included

- Total nonagricultural employment
- Manufacturing employment
- Durable manufacturing employment
- Nondurable manufacturing employment
- Nonmanufacturing employment
- Hours worked per week
- Average hourly earnings
- Number of unemployed
- Percentage of unemployed
- Civilian labor force
- Bank debits

Regions (* selected series only)

- Boston
- Bridgeport
- * Brockton
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- Hartford
- * Lawrence-Haverhill
- * Lowell
- Manchester
- New Bedford
- New Britain
- New Haven
- Portland
- Providence
- Springfield
- Stamford
- Waterbury
- Worcester

Boston Area

Components of the consumer price index

Conventional mortgages at different interest rates (also available for the area outside Boston).

3. MACROECONOMIC FORECASTS

The Chase macro model, the largest fully simultaneous model ever used for actual forecasting, is used to generate forecasts up to ten quarters in the future for over 200 economics variables. The model contains a non-linear monetary sector, greater detail for the components of aggregate demand, and incorporates new developments in the wage and price equations. The relationships between the demand, monetary, price and other sectors incorporate the complex interactions which are observed in the actual economy. A detailed written monthly report provides an extensive analysis as well as further discussion of the forecast results and the assumptions which are used to generate our standard and alternate forecasts. Each month three additional alternate forecasts are calculated using different assumptions for the policy variables. The model is also available on time sharing which enables the user to enter his own assumptions and generate his own forecasts.

a) Available, then, in this series are all of the standard national income accounts series plus all other quarterly series used in the estimation of the Chase Econometrics Macroeconomic Model, including:

Gross national product in current and constant dollars

National income by type of income

National income by industry

Personal income components

Personal consumption expenditures in current and constant dollars

Federal government receipts and expenditures

State and local government receipts and expenditures
Implicit price deflators for GNP
Imports and exports in current and constant dollars
Price and volume indexes of world trade
Wage rates and unit labor costs
Capital stocks (as calculated by Chase Econometrics)
Index of capacity utilization (as calculated by Chase Econometrics)
Rental cost of capital (as calculated by Chase Econometrics)
Index of credit rationing (as calculated by Chase Econometrics)

b) Also available are all other series in the Macroeconomic Model not included in the standard national income accounts:

Personal income components
Consumer price indexes
Employment, labor force and population by age-sex classification
Hourly wages and earnings
New and unfilled orders
Construction statistics and housing starts
Components of the money supply and other deposits
Interest rates
New passenger car registrations
Stock prices and yields
Detailed personal consumption expenditures in current and constant dollars
Detailed Federal Government receipts and expenditures
Detailed State and local government receipts and expenditures
Detailed investment in structures in current and constant dollars

Detailed investment in producers' durable equipment in current and constant dollars

Implicit price deflators for personal consumption expenditures

Implicit price deflators for investment in structures

Implicit price deflators for investment in producers' durable equipment

4. LONG-RUN INDUSTRY FORECASTING SERVICE

Forecasts at the individual industry level are provided on an annual basis up to ten years in the future. Specific variables forecasted for each of 50 SIC code industries include sales, prices, profits, cash flow, investment, employment, wages, and unit labor costs. The forecasts are also provided for all 80 industries listed in the 1963 input-output table, with additional disaggregation for the transportation and service sectors.

The Chase Long-Run Industry Forecasting Service generates industry forecasts by combining long-run forecasts from a macroeconomic model, input-output techniques, and multiple regression analysis at the industry level. Forecasts are available for up to fifteen variables for each of 80 input/output industries and 50 SIC code industries. The complete service includes the following features:

Annual forecasts for up to 10 years into the future for all 80 input/output industries and 50 SIC code industries. The last section of this brochure includes a table listing the variables forecast for each industry and provides a sample of the actual output. Forecasts are updated on a quarterly basis. These quarterly releases contain:

(a) A written summary of the basic trends in the economy and the principal assumptions about long-range behavior of key policy and demographic variables

(b) The complete long-range forecasts arranged by industrial classification

(c) A ranking of the industries by rate of growth for all major variables

(d) Graphs showing the historical and projected growth of each manufacturing SIC code industry at a glance.

The long-range projections are fully consistent with the short-run forecasts during the period of overlap. It should be stressed that this internal consistency can be guaranteed only in a completely simultaneous system and cannot in general be attained with a recursive solution.

Solutions from the Chase Econometrics macro model are combined with input-output analysis and additional regression equations at the industry level to generate forecasts at the two and three-digit (SIC code) level for the following variables:

For all industries in the 80-sector I/O Table

- Shipments, current dollars
- Shipments, constant dollars (volume)
- Price index

For all two-digit manufacturing industries

- Corporate profits
- Corporate income taxes
- Dividends
- Depreciation
- Corporate cash flow
- Investment
- Capacity utilization
- Employment, production workers
- Employment, overhead workers
- Wage rates, production workers
- Wage rates, overhead workers
- Hours worked per week
- Unit labor costs
- Labor productivity

Wholesale price index

Gross product originating (value added)

For all other two-digit industries (where data are available)

Corporate profits

Corporate income taxes

Dividends

Depreciation

Corporate cash flow

Employment

Wage rates

Unit labor costs

Labor productivity

Price deflator

Gross product originating (value added)

5. SHORT-RUN INDUSTRY FORECASTING SERVICE

The Chase Short-Run Industry Forecasting Service offers in tabular, graphic, and text form quarterly forecasts of the following variables:

(a) The index of industrial production, sales in current and constant dollars, investment, profits, taxes, dividends, depreciation, and cash flow for 20 manufacturing industries.

Food and kindred products

Textile mill products

Apparel and other textile products

Lumber and wood products

Furniture and fixtures

Paper and allied products

Printing and publishing

Chemicals and allied products

Petroleum and coal products

Rubber and plastics products

Stone, clay and glass products

Basic iron and steel

Other primary metals

Fabricated metal products

Machinery, ex. electrical

Electrical equipment and supplies

Other transportation equipment

Motor vehicles and equipment

Instruments and related products

Misc. manufacturing

(b) Retail Sales for 14 Major Categories

Passenger car, other auto, dealers

Tire, battery accessory dealers

Furniture, home furnishings stores

Household appliance, TV, radio

Lumber, building materials dealers

Hardware stores

Apparel group

Drug and proprietary stores

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National Planning Association
1666 Connecticut Avenue, N.W.
Washington, D.C. 20036

National Planning Association (NPA) provides the following two comprehensive projective services:

1) National Economic Projections

2) Regional Economic Projections

A. National Economic Projections

The projection model used in developing NPA's ongoing series of National economic and demographic projections (see IV A), is comprised of 164 variables of which 99 are endogenous. Among the 65 predetermined variables 8 are instruments, i.e., variables that can be affected by government, 34 are data variables and 23 are lagged endogenous variables. There are 99 equations and identities to explain the same number of endogenous variables. The equations consist of 44 structural equations and 56 definitional and balancing identities.

The model is recursive, meaning that the causal relationships run in one direction only. More formally, the equations can be ordered in such a way that the system has a triangular matrix of endogenous variables and the covariance matrix of residuals is diagonal. With the equations arranged in this order, each equation may be regarded as representing the causal determination of one endogenous variable as the remaining endogenous variables in the equation have been determined in equations which are higher in the ordering. These variables are, in effect, predetermined with respect to this equation although they are endogenous to the system of equations as a whole. The fact that Ordinary Least Squares provides consistent estimates in the equations of a correctly specified recursive system has been provided elsewhere and needs no elaboration here.

In addition to being relatively simple to calculate, OLS uses up fewer degrees of freedom than the commonly used estimating procedures. This is an important advantage to be gained from using a recursive model, where data are scarce because even relatively small simultaneous subsets of equations can exhaust the available degrees of freedom. This is an important consideration in the model presented here as it is tested against annual data for post-war years.

As it is, the specification of some of the functions present some small sample problems. For instance, there are a few functions employing lagged endogenous variables to accomplish what is effectively an extrapolation of an endogenous variable. This was done because behavioral variables with high explanatory power could not be found; however, it causes bias for small sample.

Gross National Product and National Income[1]

- Gross National Product by Major Component (OBE 1.1), 1929-1980
- Gross National Product by Major Component (OBE 1.2), 1929-1980
- National Income by Type of Income (OBE 1.10), 1929-1980
- Selected Per Capita Income and Product Series (OBE 7.6), 1929-1980
- Selected Per Capita Income and Product Series (OBE 7.6), 1929-1980
- Percent Distribution of GNP by Major Component, 1929-1980 (Current Dollars
- Percent Distribution of GNP by Major Component, 1929-1980 (Constant 1958 Dollars)
- Relation of Gross National Product and National Income (OBE 1.9), 1929-1980
- Relation of National Income and Personal Income (OBE 1.9), 1929-1980
- Selected Economic Productivity Measures for Gross National Product and Gross Private Product, 1948-1980
- Average Annual Growth Rate for Selected Indicators, 1948-1980

Personal Income and Consumption

- Personal Income and Its Disposition (OBE 2.1), 1929-1980
- Personal Consumption Expenditures by Type of Product, Selected Years, 1948-1980 (Current Prices)
- Personal Consumption Expenditures by Type of Product, Selected Years, 1948-1980 (1958 Prices)
- Distribution of Personal Consumption Expenditures by Major Component, Selected Years, 1948-1980
- Average Annual Growth of Personal Consumption Expenditures by Major Components, Selected Periods, 1948-1980
- Distribution of Consumer Units by Income Class: 1968, 1975 and 1980
- Distribution of Consumer Unit Income by Income Class: 1968, 1975 and 1980

Government Receipts and Expenditures

- Total Government Receipts and Expenditures
- Federal Government Receipts and Expenditures (OBE 3.1), 1929-1980
- State and Local Government Receipts and Expenditures (OBE 3.3), 1929-1980

Foreign Transactions

- Foreign Transactions (OBE 4.1), 1948-1980

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[1] OBE references are to the national income and product account tables prepared regularly by the U.S. Office of Business Economics.

Savings and Investment

Sources and Uses of Gross Saving (OBE 5.1), 1948-1980
Purchases of Producers' Durable Equipment by Type (OBE 5.4), 1948-1980
Purchases of Private Nonresidential Structures by Type (OBE 5.2), 1948-1980
Distribution of Purchases of Producers' Durable Equipment by Type, 1948-1980
Distribution of Purchases of Private Nonresidential Structures ty Type, 1948-1980
Purchases of Producers' Durable Equipment by Type (OBE 5.5), 1948-1980
Purchases of Private Nonresidential Structures by Type (OBE 5.3), 1948-1980
Distribution of Purchases of Producers' Durable Equipment by Type, 1948-1980
Distribution of Purchases of Private Nonresidential Structures by Type, 1948-1980
Private Residential Construction, 1948-1980

Population and Labor Force

Population, Labor Force, Employment, and Man-hours, 1929-1980
Total Population by Age and Sex, 1950-1980
Distribution of Total Population by Age and Sex, 1950-1980
Total Labor Force Participation Rates by Age and Sex, 1950-1980
Total Labor Force by Age and Sex, 1950-1980
Distribution of Total Labor Force by Age and Sex, 1950-1980
Total White Population by Age and Sex, 1950-1980
White Labor Force Participation Rates by Age and Sex, 1955-1980
Total White Labor Force by Age and Sex, 1955-1980
Total Nonwhite Population by Age and Sex, 1950-1980
Nonwhite Labor Force Participation Rates by Age and Sex, 1955-1980
Total Nonwhite Labor Force by Age and Sex, 1955-1980

Supplementary Tables

Gross National Product: Receipts and Expenditures by Major Economic Groups (OBE 7.1)
Federal Reserve Board Index of Industrial Production, 1919-1980

Implicit Deflators

Implicit Price Deflators for Gross National Product (OBE 8.1), 1948-1980
Implicit Price Deflators-Personal Consumption Expenditures by Type of Product, Selected Years, 1948-1980
Implicit Price Deflators for Producers' Durable Equipment by Type (OBE 8.8), 1948-1980
Implicit Price Deflators for Private Structures by Type (OBE 8.7), 1948-1980

B. Regional Economic Projections

NPA's Regional Economic Projections Series (REPS) has been an ongoing research activity since 1962, providing an annual series of projections of population, industry employment and personal income for eight multi-state regions, 50 states and 230 metropolitan areas. Based upon NPA's work on national economic and demographic trend projections, the REPS series prepares projections of consumer saving and spending consistent with each region's level of personal income and indicated pattern of consumer expenditure behavior.

Considerable emphasis in the Regional Projections Series is placed on forecasting likely changes in the pattern of interstate migration and on anticipating the regional distribution of industrial activity. In this respect, Regional series projections are particularly useful for state and local government agencies and planning organizations engaged in environmental planning.

Projections series reports are distributed on a subscription basis to private business firms, government departments and agencies, and non-profit organizations. The series also provides separate state and metropolitan area reports on a regular basis containing revised and updated projections of the principal economic and demographic indicators of growth and change.

REPS is a two-stage step-down of national projections provided by NPA's National Economic Projections Series (NEPS), first to states, and then to SMSAs. It embodies a single causal chain from employment to population and income, permitting a recursive formulation which makes solution rather easy.

The fundamental employment model distinguishes basic industries projected by a form of shift-share, and non-basic industries projected as functions of local demand.

The model is run twice, once to derive state totals from national totals, and secondly to derive SMSA figures from state figures. It thus possesses extremely tight aggregation controls, combined with a considerable flexibility in projection at the SMSA level. For states, the analytical region is the whole U.S., while for SMSAs the analytical region is a suitably defined collection of states. In recent REPS projections, the analytical area has been different for different industries.

A selected list of economic variables available for each region from the NPA's model follows:

Historical and Projected Trends for Regions, States, and Metropolitan Areas

- National Economic and Demographic Framework
- Regional and State Growth Indicators
  - Population
  - Employment
  - Personal Income
  - Per Capita Personal Income
- Metropolitan Area Dimension

Saving and Consumption Patterns

- Regional Markets
  - Personal Taxes and Nontax Payments
  - Personal Saving
  - Consumption Expenditure Patterns
    - Food and Tobacco
    - Clothing and Accessories
    - Personal Care
    - Housing
    - Household Operation
    - Medical Care Expenses
    - Personal Business
    - Transportation Expenditures
    - Recreation, Including Foreign Travel
    - Private Education and Religious and Welfare Activities

Metropolitan Area Markets

- Consumption Expenditure Patterns

SOCIO-ECONOMIC ASPECTS OF ENVIRONMENTAL PROBLEMS:

SECONDARY INFORMATION SOURCES

By

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Environment Information Center, Inc.

National Environmental Information Symposium
U.S. Environmental Protection Agency
Cincinnati, Ohio

September 26, 1972

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OUTLINE:

1. What is socio-economic information
    a. a conceptual model
    b. examples of socio-economic cause-effect
2. Horizontal information coverage
    a. the concept of single-source access
        (1) system concept
        (2) system description
    b. other multi-field coverage
    c. general coverage sources
3. Vertical information coverage
    a. population
    b. technology development
    c. political dynamics
    d. societal behavior and values
    e. economics
4. Appendices
    a. select roster of secondary information sources
    b. ACCESS Classification System

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"Man exercises considerable control over his destiny. Thus, the role of political, economic and other institutions must be considered as interdependent and powerful influences over the future conditions of the world."

- from "Environmental Quality, The Third Annual Report of the Council on Environmental Quality", 1972, p. 70 Sup. Doc.

1. WHAT IS SOCIO-ECONOMIC INFORMATION?

This question was repeatedly raised during the preparatory sessions for this conference. And since we are about to become involved in systems of socio-economic information, it is important to understand why this area is of crucial importance. This is essential to my discussion and particularly to understanding the problems one will encounter in dealing with this area of information.

We are fast recognizing that environmental problems must be solved on two planes: the short term (implementing laws, standards and control technology) which is being discussed in the concurrent sessions; and the long term (controlling political, social and economic factors). In other words, a catalytic converter will lessen nitrous oxide pollution from cars, but it doesn't solve the problem of resource consumption, urban sprawl and junkyards. After "The Limits to Growth", "The Bluprint for Survival", and the Stockholm Conference, we know that pollution is only the tip of the iceberg. Ultimately, all environmental problems stem from five areas:

1. Population (growth rates and migration patterns)
2. Technology development (including housing, transportation, food production and particularly their energy implications)
3. Political dynamics (fiscal, monetary policies, and in particular, governmental standards and incentives).
4. Societal behavior and value patterns (the reasons we live, play and work the way we do -- environmental behavior)
5. Economics (the quantitative relationships between the preceeding factors)

The following crude model will help conceptualize the relationship among these factors:
(See Figure 1)

If we plug in some examples, it will help illustrate why an environmental researcher ultimately ends up at the socio-economic aspects of the problem:

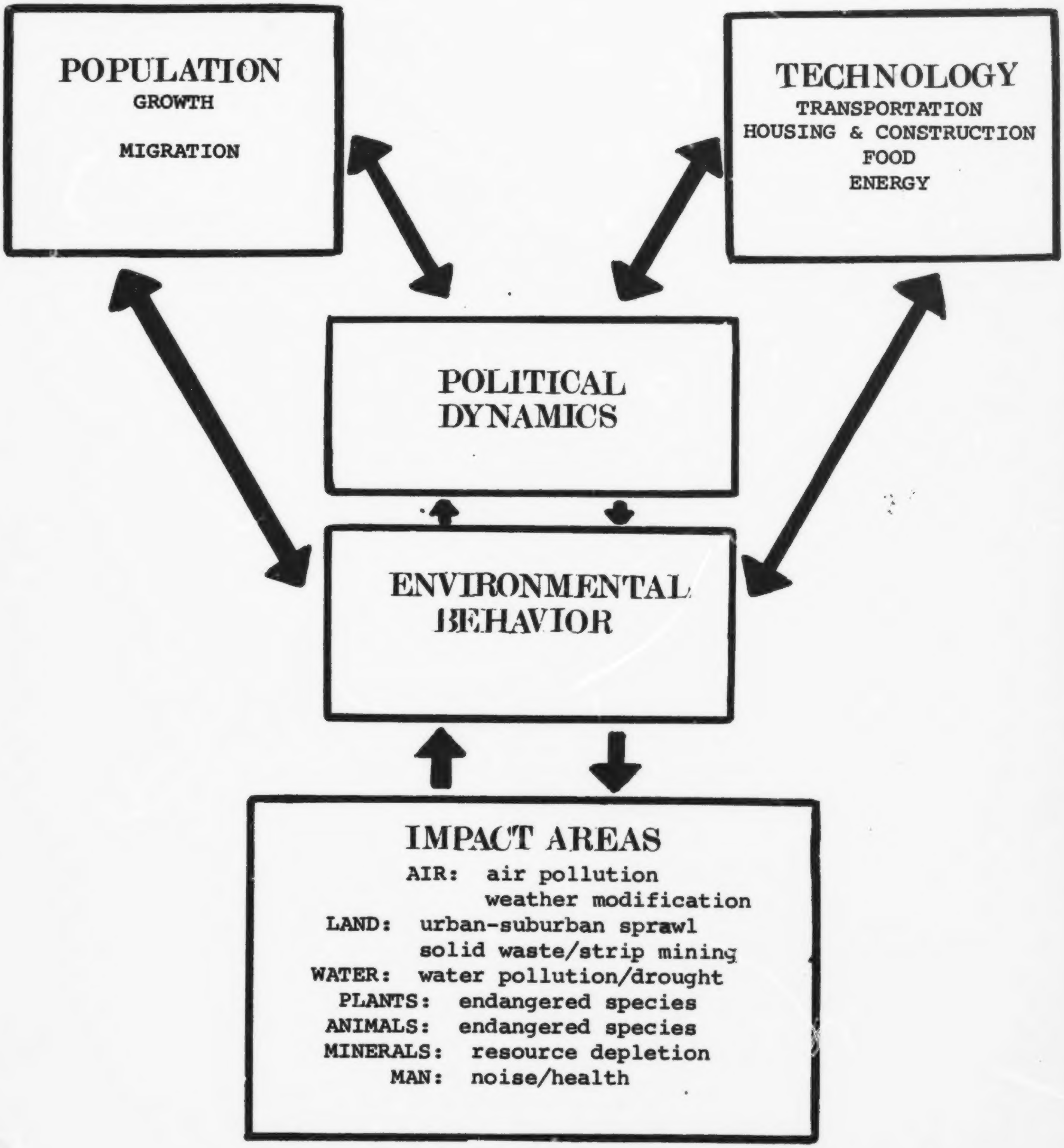
Example #1: Damming of Wild and Scenic Rivers

Effects: Very few western rivers remain in their natural, wild state. Most have been dammed to provide irrigation and drinking water and to generate hydroelectric power. Causes: political pressures emanating from the Southwest, where excessive migrations in search of cheap land and open space required water for drinking, farming and industry that was just not there. Meanwhile, however, water-rich land in the South is placed in the land bank and farmers are

Fig. 1

SOCIO-ECONOMIC-ENVIRONMENTAL INTERRELATIONSHIPS

A CONCEPTUAL MODEL



subsidized to keep land fallow. The root causes: political and economic ones, not just technology.

Example #2 Urban-Suburban Sprawl

Effect: Open space is fast disappearing under low density housing developments, shopping centers, parking lots and highways. Causes: the post-war G.I. Bill and the National Defense Highway Act which encouraged single-family home ownership (no downpayment) and a highly personalized transportation mode (the automobile). If we project certain political and economic events occurring today, we can probably project future impact.

Example #3: Federal Auto Emission Standards

Stricter emission standards have resurrected the Wankel engine, a low efficiency, low compression engine that will require lower octane (lead free) fuels, but more of them. What effect will this have on resource consumption?

Example #4: Zero Discharge

If this comes to pass, as it seems likely for certain industries, industrial plants will be freed from waterside locations since all waters can be recycled. There will then be a mass relocation to market areas -- cities and suburbs --in order to cut transportation costs. What effect will this have on the transportation industry? On land use? Jobs? If you are an information specialist charged with ferreting out such matters, where do you start?

2. HORIZONTAL INFORMATION COVERAGE

2a. Getting a Handle on the Problem -- the concept of single source access.

The rapid emergence of environment as a multi-disciplined profession, the resulting information explosion and the infusion of "outsiders" into a hitherto privileged professional sanctuary also created the need for new concepts in information handling. In 1970, when environment was not yet a recognized profession (indeed, when many felt it was a passing public fad) Environment Information Center was created with the express purpose of developing an information system that would closely parallel *all* aspects of environmental problems -- cause *and* effect. We regarded "environment" as a total, interrelated concept, and built a system that permitted cross referencing between, for instance, population trends and air pollution. It was conceived as a *single-source access* system which:

a. covered *all* information categories important to environmental problem solving

b. covered *all* types of media used to convey environmentally significant information: magazines, books, reports, films, conference papers, special publications, speeches.

c. used all practicable media to disseminate and access information from this data bank, including:

(1) abstract journals and services
(2) annual cumulative subject, industry and author indexes
(3) document retrieval services
(4) microfiche document subscription and retrieval services
(5) computer tape services
(6) special searches and studies
(7) on-line retrieval systems

(8) selective dissemination of information.

Both a controlled vocabulary and a conceptual cataloging system were developed for 21 environmental problem areas. This category system permits researchers to enter 21 major cause-effect areas:

Air Pollution
Chemical and Biological Contamination
Energy
Environmental Education
Environmental Design
Food and Drugs
General
International
Land Use and Misuse
Noise Pollution
Non-Renewable Resources
Oceans and Estuaries
Population Planning and Control
Radiological Contamination
Recreation
Renewable Resources
Solid Waste
Transportation
Water Pollution
Weather Modification and Geophysical Change
Wildlife

A more detailed description is contained in Appendix B.

Inputs: This system, called Environment Information ACCESS, covers 2,000 international periodicals, government reports and documents, select speeches, research reports, newspaper articles, conference papers and proceedings; books, legislation, Federal Register entries, patents, films.

Throughput: All items are acquired in full document form, abstracted by EIC staff, indexed by subject, industry, author, geography and organization, and often cross-referenced.

Output: The data bank is tapped through a bi-weekly abstract journal (ACCESS), an annual cumulative index (The Environment Index), hard copy document retrieval (access retrieval), microfiche document retrieval on demand or on a subscription basis per category (Envirofiche); computer tape services (The Environmental Science Citation Index); computer searches (ACCESS Search); and other publications (such as the critical guide, The Environment Film Review).

Our exhibit here displays most of these publications and provides detailed literature on all aspects of our operations. I'll be glad to answer any questions you may have.

2b. Other Horizontal Environmental Coverage:

ACCESS is unique as a horizontal information system which covers both socio-economic and environmental impact areas. Some publications do cover more than one area of environmental impact, but these are restricted to the technical aspects of air and water pollution. The best example is *Pollution Abstracts*, issued six times per year, which covers seven contamination areas: *Pollution Abstracts* provides cumulated indexes, and document retrieval, air, fresh water, marine, land, noise, sewage, and general. A publication called *Environmental Periodicals* covers similar areas, by providing the contents pages of journals. It too offers document retrieval.

2c. *General Horizontal Information Sources*:

These range in sophistication from simple citation listings, such as the Wilson Reader's Guide which covers a relatively small sample of total journal literature, to ISI's *Current Contents*, which covers 3,500. The Science Citation Index, for instance, is a system which permits one to locate articles based on the type of references they quote; offers profiling, SDI, and tearsheet retrieval.

3. SECONDARY INFORMATION SOURCES: VERTICAL COVERAGE

Since we are concerned largely with socio-economic sources, I will leave such vertical technical coverage systems as APTIC, SWIRS, etc. to our counterpart session. This also shortens my speech since few secondary information sources deal with socio-economic matters in a vertical sense. Someone researching population, for instance, is not nearly as well served as some one researching water pollution. Aside from environmental coverage offered by ACCESS, such areas as housing, transportation, population, etc. are not extensively served by their own abstract, index, retrieval and search services.

For purposes of this discussion, the word "vertical" refers to the five major areas in the model I discussed earlier:

a. Population

b. Technology Development (including transport, housing, food)

c. Political Dynamics

d. Societal Behavior and Values (including recreation)

e. Economics: the quantitative relationships among all these,

Since a list of sources is attached to my paper (Appendix A), I will not waste time by reading these. Emphasis here is on bibliographic systems rather than hard data -- since the bibliographic ultimately leads to hard data; but a select scattering of important hard data sources -- such as the Census -- is also included. Let me briefly summarize the five areas:

1. Population

Most hard data comes from the Bureau of the Census, or the United Nations (UNESCO). Not only does the Census measure the crucial inputs of population growth and migration, it also provides data applicable to housing, employment, business statistics, education and recreation. Much of it will probably go into the new SUMSTAT (Summary Statistics) program now being conceptualized. Until then, however, the best way to unearth Census data is through the quarterly *Bureau of the Census Catalog*, which also announces tape services. Or through the monthly *Catalog of Government Publications*. Bibliographic information on population control is best obtained through *ACCESS* (abstracts) or the Population Index (citations only).

2. Technology

According to Barry Commoner, this is where it's at, but it is very hard to get at (**that** is, monitor new technologies and their potential impacts). Aside from the horizontal coverage of ACCESS, one must consult several dozen sources: the Census, Departments of Transportation, HUD, and Commerce (Patent Office), trade associations, and such commercial services as F.W. Dodge Corp. (a div. of McGraw Hill) which measures housing starts, new permits, etc.; or Engineering Index, a monthly abstract service.

3. Political

My earlier examples illustrated how potent federal laws, standards and incentives can be. To keep up with new legislation, agency decisions and federal programs, the various legal services (which are being covered in a concurrent session) are probably best. Congressional Information Service is a good way to follow the workings of Congress; but probably the best way to get a qualitative feel for what's going on is through primary media (National Journal, New York Times, Congressional Quarterly). All of these have companion indexes.

4. Societal Behavior and Values

I'm really speaking of an emerging field called "environmental behavior" -- why and how man works, creates, plays, the means of housing and transportation he chooses (rather than the actual technology). Aside from raw statistics provided by the Census, and

Bureau of Outdoor Recreation (Recreation Register), coverage is restricted to primary publications such as Sage publications journal Environment and Behavior and RC's Design and Environment. The journal literature is best followed through ACCESS, or Current Contents.

5. Economics

A wealth of raw data is available from federal agencies and commercial services. Every conceivable quantitative aspect seems to be cataloged: power consumption, distribution patterns, resource depletion, employment. Useful secondary sources include Predicasts, which cross references statistics with bibliographic sources. Example: tons of coal consumed in the U.S. is contrasted with baseline data; source of data is given; and data can be retrieved by subject or Standard Industrial Classifications .

Two excellent sources that should not be overlooked are: CEQ, whose Annual Report is an encyclopedia of socio-techno-economic facts; and the Council on Economic Priorities, a non-profit public interest group which issues well-documented studies on the social/environmental impacts of economic behavior. Names, addresses, products and prices of these services are attached to this paper. If anyone cannot obtain a copy here, please write me at EIC, 124 E. 39th St., NYC 10016.

We opened this discussion with a question: why socio-economic information? I'd like to close with an answer -- a quote taken from the CEQ Annual Report:

> "Man is not a captive of uncontrollable forces. He can exercise a significant degree of control over his future if he has some idea of the problems which lie ahead."

Hopefully this presentation has contributed to a better understanding of how this can be done.

APPENDIX A:

Select Roster of Secondary Information Sources

I. Population Dynamics

A. Primary Source Data

Bureau of Census (U.S.)
Publications Distribution Section
Washington, D.C. 20233

Current Population Reports ($14.00) (includes 8 series of reports, e.g., "Population Characteristics," "Population Estimates and Projections," monthly"Estimates of the Total Population of the U.S." - monthly, "Farm Population,"etc)

Statistical Office of the United Nations
Department of Economic and Social Affairs
United Nations
New York, New York 10017

Population and Vital Statistics Report (quarterly update on population and vital statistics for every country of the world; $4.00)

B. Secondary/Bibliographic Sources

Office of Population Research
Princeton University
5 Ivy Lane
Princeton, N.J. 08540

Population Index (Q, $15.00)

Environment Information Center, Inc.
124 East 39th Street
New York, New York 10016

Environment Information ACCESS (SM, $150.00)
Category 13

Health Services and Mental Health Administration
Department of Health, Education, and Welfare
5600 Fishers Lane, Room 12A-33
Rockville, Maryland 20852

Family Planning Digest (BM)

APPENDIX A (Cont'd)

Population Council
245 Park Avenue
New York, New York 10017

Current Publications in Population/Family Planning (M)

Reproduction Research Information Service Ltd.
141 Newmarket Road
Cambridge, England

Bibliography of Reproduction (M)

II Technology Development:

TRANSPORTATION

A. Primary Source Data

Bureau of Census (U.S.)
Chief of the Transportation Division
Washington D.C. 20233

1967 Census of Transportation

a. Commodity Transportation Survey, 1967: Shipments from Production Area to Destination Area (contains 484,000 records, available on four reels of computer tape, either IBM/360, 7- or 9-track, or Univac 1107, 9-track)

b. Commodity Transportation Survey, 1967: Shipments from State of Origin to State of Destination (contains 705,000 records, available on 5 reels of tape, either IBM/360 7- or 9-track, or Univac 1107, 9-track)

B. Secondary/Bibliographic Sources

Environment Information Center, Inc.
124 East 39th Street
New York, New York 10016

Environment Information ACCESS (SM, $150.00)
Category 18 Transportation

Society of Automotive Engineers (SAE)
Two Pennsylvania Plaza
New York, New York 10001

SAE Publications/Readers Service
(papers and technical information developed by SAE, cited in SAE Journal of Automotive Engineering, M)

Northwestern University Transportation Center
1818 Hinman Avenue
Evanston, Illinois 60204

Current Literature in Traffic and Transportation (M, $6.00)

Highway Research Board
National Academy of Sciences
2101 Constitution Avenue
Washington, D.C. 20418

Highway Research Abstracts (M, $5.00)
Highway Research Information Service Abstracts (Q, $20.00)
(abstracts of actual research in progress)

U.S. Department of Transportation (DOT)
Washington D.C. 20590

United Engineering Library
395 E. 47th Street
New York, New York 10017

Engineering Index (M
Compendex

Institute for Scientific Information
325 Chestnut Street
Philadelphia, PA 19106

Current Contents: Engineering & Technology (W, $100)

H.W. Wilson
950 University Avenue
Bronx, New York 10452

Applied Science & Technology Index (M, price varies)

HOUSING

A. Primary Source Data

Bureau of Census
Publication Distribution Section
Washington D.C. 20233

General Housing Characteristics (1970 statistics; 58 reports, $61.35)
Current Housing Reports: Housing Vacancies (Q & A, $1.50)

McGraw-Hill Information Systems
F.W. Dodge Co.
1221 Avenue of the Americas
New York, New York

Dodge Reports (see below)

B. Secondary/Bibliographic Sources

Environment Information Center, Inc.
124 East 39th Street
New York, New York 10016

Environment Information ACCESS (SM, $150.00)
Category 05 Environmental Design

U.S. Department of Housing and Urban Development (HUD)
Washington D.C. 20410

Housing and Urban Development Trends (M)

Housing and Renewal Services
1319 F Street N.W.
Washington D.C. 20004

Housing and Renewal Index (SM, $60,00)

National Association of Home Builders of the U.S. (NAHB)
1625 L Street N.W.
Washington D.C. 20036

Library Bulletin (M, free to members)

Environment Information Center Inc
124 E 39th Street
New York, New York 10016

ENERGY

A. Primary Source Data

Federal Power Commission
Office of Public Information
Washington D.C. 20426

FPC News (W, free)
Federal Power Statistics

B. Secondary/Bibliographic Sources

Environment Information Center, Inc.
124 East 39th Street
New York, New York 10016

Environment Information ACCESS (SM, $150.00)
Category 03 Energy

Institute for Scientific Information
325 Chestnut Street
Philadelphia, PA 19106

Current Contents (W, $100 per service)
Science Citation Index
OATS (tearsheet service)
ACSA (profile searches)

Resource Use

A. Primary Source Data

Bureau of Census
Washington D.C. 20233

1967 Census of Mineral Industries (14 reports, $8.10)
Area Statistics (49 reports, $16.80)

B. Secondary/Bibliographic Sources

Environment Information Center, Inc.
124 East 39th Street
New York, New York 10016

Environment Information ACCESS (SM, $150.00)
Categories 11 Non-Renewable Resources
" 15 Terrestrial Resources
" 16 Water Resources

American Petroleum Institute
555 Madison Avenue
New York, New York 10022

Abstracts of Air and Water Conservation Literature and Patents (W, $275-550)

Abstracts of Petroleum Substitutes Literature and Patents (M, $150-275)

Abstracts of Refining Literature (W, $1100-13,000)

Abstracts of Refining Patents (W, $2000-10,000)

Abstracts of Transportation and Storage Literature and Patents (M, $275-550)

Institute for Scientific Information
325 Chestnut Street
Philadelphia, PA 19106

Current Contents:
Engineering & Technology (W, $100)
Physical & Chemical Science (W, $100)
Life Sciences (W, $100)

H.W. Wilson Co.
950 University Avenue
Bronx, New York 10452

Biological and Agricultural Index (M, price varies)

FOOD

A. Primary Source Data

Food and Agriculture Organization of the U.N. (FAO)
Documentation Centre
Via delle Terme di Caracalla
Rome, Italy

FAO Documentation - Current Index (M, free)

B. Secondary/Bibliographic Data

Environment Information Center, Inc.
124 East 39th Street
New York, New York 10016

Environment Information ACCESS (SM, $150.00)
Category of Food & Drugs

Institute for Scientific Information
325 Chestnut Street
Philadelphia, PA 19106

Current Contents:
Agricultural, Food & Vet. Sciences (W, $100)

General Product Information

Thomas Publishing Co.
461 8th Ave.
New York, New York

Thomas Register (catalog service)

United States Patent Office
Washington D.C. 20231

Official Gazette (W, $78.oo)

III. Political Dynamics

Bibliographic Sources:

Environment Information Center,
124 East 39th St.
New York, N.Y. 10016

Environment Information ACCESS(SM, $150)
Categories 1-21; 07 General, 08 International

Bureau of National Affairs (BNA)
1231 25th St.
Washington, D.C. 20037

Environment Reporter (M, $100)

New York Times Company
229 West 43rd St.
New York, N.Y. 10036

New York Times Index (SM, $78; microfilm $525-$3,035)
New York Times Data Bank (an on-line retrieval system now under development)

Commerce Clearinghouse, Inc. (CCH)
4025 W. Peterson Ave.
Chicago, Ill.

various legal documentation services

Congressional Information Service
500 Montgomery Bldg.
Washington, D.C. 20014

[continued on next page]

CIS Index (M, price varies $95--$395)
Annual Index $190

H.W. Wilson Co.
950 University Ave.
Bronx, New York 10452

Index to Legal Periodicals (M, price varies)

IV. Societal Behavior (Environmental Behavior)

A. Primary Source Data

Bureau of Labor Statistics
U.S. Dept. of Labor
14th St. and Constitution Ave.
Washington, D.C. 20210

Monthly Labor Review ($9.00)

League of Federal Recreation Assn. Inc.
927 15th St. N.W.
Washington, D.C. 20005

Recreation Register (M)

Bureau of Outdoor Recreation
U.S. Department of the Interior
Washington, D.C. 20240

Selected Outdoor Recreation Statistics (March 1971, 145p. $1.25)

B. Secondary/Bibliographic Sources

Sociological Abstracts
73 8th Ave.
Brooklyn,N.Y. 11215

Sociological Abstracts (8/yr $100; cum index every 10 yrs.)
(Divided into 28 areas of sociology; provides hard copy retrieval of articles and conference papers)

H.W. Wilson Co.
950 University Ave.
Bronx, N.Y. 10452

Social Sciences and Humanities Index (M, price varies)

V. Economics

A. Primary Source Data

Dun & Bradstreet
99 Church St.
New York, N.Y. 10007

DMI --Dun Market Identifiers
lists 3 million businesses, providing: sales volume, number of employees, net worth, when started. Cost: $40 -$155 per M

McGraw-Hill Information Systems
New York, N.Y.
F.W. Dodge Div.

Dodge Reports
compilation of all new construction projects in a given area on a daily basis; lists location, contractor data, bidding information; price varies.

Standard & Poors
345 Hudson St.
New York, N.Y.

Compustat
machine readable tape service providing historical financial information on large companies 20 years back. Price varies, but complete package is $25,000.

ISL Tapes (Investment Statistics)
daily stock transactions, corporate pricing, bond pricing, $750 -$9,000.

Chase Econometrics, Inc.
555 City Line Ave.
Bala-Cynwyd, Pa. 19004

various reports, economic data bases, macroeconomic models, industry models, economic consulting.

Interactive Data Corp.
486 Totten Pond Road
Waltham, Mass. 02154

on-line terminals: national income and product accounts, GNP & Components by Industry, new management and equipment expenditures, retail and wholesale trade and inventory.

B. Secondary/Bibliographic Sources:

Predicasts, Inc.
10550 Park Lane
University Circle
Cleveland, Ohio 44106

Funk and Scott Index of Corporations and Industries (W, $132) covers analysis, opinions, forecasts, and newsworthy items appearing in trade and financial press, analytical reports of investment services, bank newsletters; covers articles by industry, product, and subject; also by S.I.C. cddes.

Predicasts (Q, $172)
economic and forecast statistics, consists of summary forecasts with historical data from 1957-68; composite forecasts for 1969,1970,1975, and 1980, on general economics, products, transportation, construction, capital index spending, key world forecasts, and capacity forecasts; also general economic abstracts on population, labor force, and employment, national income, and expenditure, production and business capacity, construction, and source of forecasts.

Environment Information Center, Inc.
124 East 39th St.
New York, N.Y. 10016

Environment Information ACCESS (SM, $150)

Compendium Publishers Int'l Corp.
2175 Lemoine Ave.
Ft. Lee, N.J. 07024

SEARCH: 19 divisions (M, $25-$60)
chemical, production data

Council on Environmental Quality
722 Jackson Place, N.W.
Washington, D.C. 20006

Annual Report (Environmental Quality) third report, 1972

Council on Economic Priorities
456 Greenwhich St.
New York, N.Y. 10013

Economic Priorities Report (BM,$20)
also, in-depth studies on electric power and utility and paper industries

H.W. Wilson Co.
950 University Ave.
Bronx, N.Y. 10452

Business Periodicals Index (M, price varies)

APPENDIX B: ACCESS CLASSIFICATION SYSTEM

1 Air Pollution

Includes air pollution aspects of aircraft and auto emissions, emissions from extracting, refining and manufacturing industries, incineration, electric power generation, industrial and residential heating, airborne gases, particulates, thermal air pollution.

2 Chemical and Biological Contamination

Includes contamination aspects of chemicals and biological agents: chemical and biological warfare, plant and animal diseases, pests; agricultural chemicals: pesticides, fungicides, herbicides, insecticides, fertilizers; metal poisoning: mercury, lead, zinc; detergents: phosphates, nitrates.

3 Energy

Includes energy aspects of nuclear and conventional electric power generation, fission, fusion, hydroelectric, pumped storage, chemical, unconventional: solar, geothermal, waves and tides.

4 Environmental Education

Includes both philosophical and operational aspects; curriculum planning and development; environmental study areas; as a subject, and academic discipline; including adult and community educational programs.

5 Environmental Design & Urban Ecology

Includes building and landscape architecture and esthetic aspects of non-building architecture; visual pollution: signs, billboards, transmission lines.

6 Food and Drugs

Includes impact of environmental problems on food: agriculture, commercial fisheries, dairy farming, ranching; food processing and canning; harvest expansion and miracle crops, nutritional requirements; food poisoning and contamination.

7 General

Includes general policy, planning and programs by Federal, state and local governments, industrial trade associations, corporations, pollution control industries, environmental organizations, legal and political aspects; environmental education; problem-solving, systems analysis and computer applications. For specific pollution abatement programs, see individual categories.

8 International

Includes international and non-U.S. environmental issues; pollution and conservation problems, international cooperation, United Nations and other world agency programs.

9 Land Use and Misuse

Includes use and abuse of land and wetlands: land reclamation, power and pipeline transmission, subdivisions, construction, stripmining; planning: scenic and historic preservation, open space, urban and regional planning; recreational and real estate uses of land, including camping and wilderness.

10 Noise Pollution

Includes sources and effects of noise from aircraft, vehicles, railroad and rapid transit, construction, explosives, electronics; physiological and psychological effects.

11 Non-Renewable Resources

Includes resource aspects of minerals and fossil fuels (coal, petroleum, natural gas).

12 Oceans and Estuaries

Includes use and abuse of ocean environment; international agreements on seabed use, technology and programs for exploitation: ocean mining, farming, off-shore activities; oceanography.

13 Population Planning and Control

Includes physical, psychological and socio-economic aspects of population growth, incentives and regulations, birth control techniques: fertility adjustment, contraception, abortion, sterilization; death control.

14 Radiological Contamination

Includes sources and effects of atomic and electromagnetic radiation: mine accidents, mine tailings, seepage, waste disposal, fallout, lab accidents, reactor accidents; x-rays, extra-terrestial and microwave radiation, physiological and psychological effects.

15 Renewable Resources-Terrestrial

Includes renewal aspects of plants and soil (for animals and animal habitat, see category 21); forest management, tree farms, reforestation, new strains, logging; soil conservation; botany; (for land use and abuse, see category 9).

16 Renewable Resources-Water

Includes renewal aspects of water (for pollution aspects see category 19); water tables, watersheds, water resources, irrigation, flood control, man-made lakes, channelization, water purification, desalination, water supply; limnology; (for ocean and marine resources, see category 12).

17 Solid Waste

Includes refuse collection and disposal: litter and municipal refuse; sanitary landfill and waste structures, compaction and pulverization, incineration, water burial; waste reduction: package redesign, recycling and re-use (cryogenic reduction, plasma torch, destructive distillation).

18 Transportation

Includes transportation aspects of motor vehicles and highways, aircraft and airports, railroads, ships, mass transit; pipeline transportation; new systems and concepts; safety.

19 Water Pollution

Includes water pollution aspects of industrial, municipal, and agricultural effluents, thermal, oil, chemical, fertilizer and phosphate eutrophication, animal wastes; municipal sewage and detergents, dyes, treatment systems and processes; limnology, hydrospheric sciences.

20 Weather Modification and Geophysical Change

Includes geophysical impact of use and misuse of environmental resources; unintentional and deliberate weather modification, climate control; effects of carbon dioxide and particle accumulation, vapor trails, reflective effects of oil slicks, thermal pockets(cities); monitoring and sensing techniques, meteorology and atmospheric sciences.

21 Wildlife

Includes fish and wildlife, game preserves, wildlife management, bird sanctuaries, endangered and vanishing species, animal habitat, ichthyology and zoology.

NATIONAL ENVIRONMENTAL INFORMATION SYMPOSIUM
SOCIOECONOMIC SESSION: DOCUMENT AND REFERRAL SERVICES

Robert W. Howe
The Ohio State University

INTRODUCTION

In previous sessions of this conference there have been presentations regarding the nature of selected information centers and data banks in the socioeconomic field and also information relative to publications by associations, information centers, government agencies and private firms.

In this session we are primarily concerned with the range of services desired by users regarding information, services available, and some considerations of needs and development priorities.

In preparing for this conference a number of people from various user groups have been contacted to determine their information needs, relevant literature has been reviewed, and the experience of the speakers has also been included.

There are a variety of information needs depending heavily upon the user and the reason for his desire for information. Users in the socioeconomic field include governmental personnel at the Federal, state, and local areas. Within these areas are a variety of users with specific needs. Users of socioeconomic data also include a variety of people in the industrial community, the academic community, the public laymen and others.

DESIRED FORM OF INFORMATION

The format of information desired varies. Information requests include:

(1) Single copies of reports, speeches, etc.

(2) Abstracts or summaries of reports

(3) Bibliographies

(4) State-of-the-art reviews

(5) Critical reviews related to specific problems including recommendations regarding the problem

(6) Comparative reviews

(7) Raw data - current and retrospective

The type of information varies extensively based on the user. Hence, people providing information services need to carefully evaluate the users whom they are trying to serve and to develop information accessible in formats that users will accept and use.

USER CONSTRAINTS

User constraints also vary, but those usually included by users as priorities include the following:

(1) Usefulness of information

    a. Currency
    b. Extensiveness of data base
    c. Conciseness

(2) Response time

(3) Cost, particularly for individuals

(4) Personal accessibility to data source

    a. Opportunity to review
    b. Opportunity to interact
    c. Opportunity to select

The type of information to be made available must carefully consider both the desired form of the information and the primary user constraints for selected user groups. Some users desire and can afford critical reviews and interpretive studies. Groups of users may also form consortia or alliances and share the cost of interpreted data. Other users can not afford such services or may want primary data. Building information systems that consider these differences is essential to the use of the products of the system and also to the continued user support of the system.

TYPES OF SERVICES AVAILABLE TO USERS

Services available to the user have increased dramatically in the past decade with the development of a variety of publications, information systems and centers, and improved technology including computer hardware and software, and microfiche and microfilm.

What are the types of current referral and document services available? What are some of the basic problems facing users of socioeconomic data?

We have reviewed information available regarding organizations, information centers, document services in these fields, and a handout has been prepared for you regarding a number of these. (See appendix.) A number of users contacted prior to this symposium were not aware of several of these. Two publications are cited which have been found to be extremely useful as guides to sources of information. (See appendix.) While there are basic sources that many major university libraries will also have, these two are excellent for establishing contacts.

A review of organizations, agencies and centers listed in these documents and others we reviewed indicate a broad data base and a variety of services are available to users. We have summarized data regarding a number of organizations, agencies and centers to provide an indication of some of the resources and also limitations regarding the current socioeconomic data base.

A number of data bases exist that are not machine searchable. These data bases include print materials, non-print materials, lists of people, raw data and other such information. Access to this information is often difficult, must be obtained by interaction with an organization at some distance, or is restricted to the use of the local staff or people in the local area. If these data are not restricted due to security, personal, or proprietary rights these data bases can eventually be prepared for machine search capability.

A number of data bases are machine searchable and can be accessed by computer. These include NTIS, ERIC, MEDLARS, and others. A review of the literature and of center developments indicate many centers are placing their data bases on tape at a rapid rate. While such action provides access to the data base for each center, many of these tapes can not be searched by a variety of computers and limits the use of tapes by other centers.

Several software packages have been developed that enable the user to search a variety of data bases. These include systems used by Lockheed, Informatics, Inc., Systems Development Corporation, Battelle, and others. As more data bases are placed on these systems, the ability of a user to interact with the data base to identify the document or information he desires will increase.

A further development is the growing number of government and commercial organizations that are operational and that are being organized to serve as links between data bases and the user. These organizations are often able to use the data base and provide information analysis products targeted to user groups or specific users.

A large number of businesses, government agencies and individuals are using such services. These include primarily Federal, state, and local governmental units; industrial firms; and educational institutions and agencies. The availability of such services at a reasonable cost depends to a great extent on the existence of a searchable information base. The completeness of such service also depends on the comprehensiveness of the data base regarding the information desired.

Products developed by such centers include microfiche and hardcopy services, handbooks, data subscription services, individual compilations, and specialized reports or packages. These products may include both print and non-print materials. Examples of products produced by several centers are cited in the appendix.

A LOOK TO THE FUTURE

A look to the future indicates the need for action in several specific areas.

(1) Data and interpretative analyses desired by many users in the socioeconomic area should be obtained and be made readily available. There are a number of areas in which information is desired and not available.

(2) The currency of available data needs to be improved. In many cases data available are not current. Efforts should be made to get data (raw data, research studies, and interpretive reports) into systems at a more rapid rate.

(3) Much information is located in dispersed centers and not available to the user by a single search. An effort needs to be made to provide data systems containing extensive information bases to enable the user or the intermediate unit to have better access to a greater quantity of the available information by a single computer search. Such a data system should include raw data, research reports, sources (people and data bases) of information on a given concept, journal articles, interpretive reports, and other forms of information

(4) Success in searching any indexed data base depends upon the selection of descriptors (index words) used and on uniformity of use. An effort should be made to establish common descriptors to be used by information systems related to the socioeconomic area.

(5) An extensive directory to information centers and data bases regarding socioeconomic data should be developed. This directory should provide an extensive subject index regarding information and services available.

(6) A comprehensive information base can provide guidance to types of information in demand and also the available report and data base. If a comprehensive searchable socioeconomic information base were available, it could be used to identify information gaps. It could also be used to identify where research and data were available and avoid unnecessary duplication of effort.

APPENDIX

A SELECTED LISTING OF INFORMATION CENTERS AND SERVICES AVAILABLE IN THE SOCIOECONOMIC AREA

Compiled By

Robert W. Howe

And

Herbert Cantor

A SELECTED LISTING OF INFORMATION CENTERS AND SERVICES AVAILABLE IN THE SOCIOECONOMIC AREA

A large number of public and private organizations and agencies have been created during the past decade that focus on various facets of the socioeconomic aspects of the environment. Publications listing such centers and services have been released and continue to be updated as organizations and agencies are created, expanded, modified, or deleted.

Two relatively comprehensive publications found to be extremely useful by users queried for our presentation are the following:

1. Encyclopedia of Information Systems and Services 1971

   Edited by Anthony T. Kruzas and available from:

   Academic Media
   32 Lincoln Avenue
   Orange, New Jersey 07050

   Price $67.50

This publication provides descriptions of over 800 organizations in the United States and Canada. Information includes computer systems; information centers, data bases and services; library and information networks; data banks; documentation centers; literature storage and retrieval systems; micrographic services; research centers; clearinghouses and referral centers; and others.

Subject, institution, and personnel indexes provided are also useful.

Like any publication of this type, some of the information provided is dated.

2. Directory of Consumer Protection and Environmental Agencies

   Compiled by the California Center for Public Affairs and available from:

   Academic Media
   32 Lincoln Avenue
   Orange, New Jersey 07050

   Price $39.50

This directory is national in scope and includes descriptive information of national, regional, state and selected government and private organizations concerned with the quality of the natural and physical environment. Particular emphasis is given to those involved in formulating or influencing policy, regulation, control management, education, and information.

In the process of reviewing available information sources and services, we have selected and described a number of organizations and services that are established and that cover a range of types of services and aspects of socioeconomic data.

INFORMATION CENTERS AND SERVICES

1. Housing and Urban Development Library
Department of Housing and Urban Development
7th and D Street, S.W.
Washington, D.C. 20410

(202) 755-6376

Mrs. Elsa S. Freeman directs a staff of approximately 40 persons, more than half of whom are professionals. The Library provides the usual library services: references, inter-library loan, information searches. A program information center distributes HUD publications. The Library receives its information on American and foreign housing and community developments from federal, state and local agencies, commercial sources and printed and nonpublished materials. Holdings include approximately 455,000 volumes. The Library's facilities are available to the public for in-house use. There is no charge for most services. Bibliographies are sold by the Government Printing Office and the National Technical Information Service.

2. National Planning Association
1606 New Hampshire Avenue, N.W.
Washington, D.C. 20009

(202) 265-7685

Michael E. Carbine is the Information Director for the Association which has a staff of 100 persons, 60-70 percent of whom are professionals. The Association publishes *Looking Ahead* ten times a year, various pamphlets, policy statements and special reports on an irregular basis, *Projection Highlights* eight times per year and the *National and Regional Economic Projections Series* annually. The Association performs technical research work and the results are disseminated to its members and subscribers through its various publication. Special research projects will be undertaken on a contract basis. The scope of the Association's concern includes domestic and international economic planning and cooperation and policy issue. Information bases are agriculture, business, labor and the professions. Holdings number about 80,000 volumes. Typical users of NPA materials are market researchers, contractors, and government agencies.

NPA is expanding its work in environmental planning and research under Mr. Ivars Gutmanis who will be a speaker at the EPA symposium.

3. Smithsonian Science Information
Exchange
1730 - M Street, N.W.
Washington, D.C. 20036

(202) 381-5511

The Smithsonian Science Information Exchange, Inc. is headed by Dr. David F. Hersey, President. The Exchange collects 85,000 to 100,000 single page records of ongoing research projects each year. Contributed projects may be funded by public or private sources. Each record describes who supports the project, who does it, where and when the research is performed and usually includes a technical summary of the project. Basic and applied research in life, physical, social, behavioral and engineering sciences is covered.

Information is available in areas as specific or general as the requester desires. Subject searches, administrative information searches, investigator searches, accession number searches, standard tabulations of current projects and historical searches will be performed for varying fee schedules. Write for the latest price list.

Requests for services are accepted by phone or mail. Information is usually in the mail within 10 days.

4. National Technical Information Service
United States Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22151

(703) 321-8888

William T. Knox is the Director of the National Technical Information Service which employs over 300 persons including administrative officers, reference and information specialists, researchers and publishing and photocopying personnel. Reports and tape files of data from federal agencies and their contractors are catalogued, abstracted and indexed. A semi-monthly abstract journal as well as numerous special subject bulletins are published to apprise users of the documents available. Publications and reports are sold to the public in paperform or microfiche. Special catalogs, journal and bibliographies are also produced. Information searches are performed on request. The subject matter covered by NTIS documents includes research, engineering, study and analysis and technical reports. The Service handles in excess of 50,000 documents each year. The entire collection exceeds 680,000 titles, 100,000 of which are currently in stock.

Anyone may use NTIS. Price lists are available on request.

5. Division of Information Services
Bureau of Labor Statistics
Department of Labor
441 - G Street, N.W.
Washington, D.C. 20212

(202) 961-2913

Chief of the Division of Information Services is Kathryn D. Hoyle. A staff of two economists, seven non-professional information specialists and eight clerical personnel collect labor statistics including information on the labor force, employment and unemployment, collective bargaining, wage scales, wholesale and consumer prices, injury statistics and economic projection. Information is received from workers, businessmen, other government agencies, all of whom contribute voluntarily, the Census Bureau and surveys conducted by BLS field staff. The division maintains an extensive collection of bulletins, reports and periodicals. Information is disseminated in special bulletins and the Monthly Labor Review. Specific information requests may be phoned in or written. A walk-in information office is located in Room 1539 of the General Accounting Building at 441 - G Street, N.W., Washington, D.C. and at various field offices. There are no restrictions on who may use the Division's services, most of which are provided free of charge.

6. The Urban Institute Library
2100 - M Street, N.W.
Washington, D.C. 20037

(202) 223-1950

A staff of four information and library professionals, including the Director, Judy Fair, and five clerical and non-professional personnel collect and organize information dealing with urban matters. They provide consulting, copying, interlibrary loan, manual literature searches, reference and referral services, selected dissemination of information services, state-of-the-art compilations and micro-reproduction services. Urban Institute is published 50-60 times a year and is composed primarily of working papers, reports and monographs. The library's 10,000 holdings include 7,000 reports and 3,000 books. Information is gathered from Urban Affairs Abstracts, the National League of Cities, universities, governmental agencies and voluntary contribution as well as usual library resources.

The staff members will answer specific inquiries from the District of Columbia area, but their services are generally restricted to Urban Institute researchers. Services are not available to the general public. They are not equipped to handle outside inquiries now.

7. National Clearinghouse for Drug
Abuse Information
Department of Health, Education
and Welfare
5600 Fishers Lane
Rockville, Maryland 20852

(202) 443-4443

Seven information specialists, five information handlers, six clerical personnel and six data processing personnel collect and disseminate published information and NIMH brochures. Specific questions are answered by information specialists who send out reprints of published articles, lists, indexes and abstracts of pertinent published articles. The staff makes no attempt to evaluate the materials used. Any questions having to do with drug abuse is within the scope of Clearinghouse's competence. Their holdings consist of 10,000 articles and documents and books and 2,000 programs derived from various sources. The literature is abstracted under a private contract. There are no restrictions on use of the service. Single publications are provided free as long as they are in stock; multiple copies must be purchased from the Government Printing Office or from the original source at charge. Typical users are educators, students and the general public. Call or write for general or specific information.

Mrs. Jean McMillan is the Acting Director of the Clearinghouse.

8. Information Services Office
(Southeast Michigan Council of Governments)
American Institute of Planners
8th Floor, Book Building
1249 Washington Boulevard
Detroit, Michigan 48226

(313) 961-4266

Jim Thomas is the Information Services Officer. A staff of two professionals and ten clerical personnel handle information inquiries within the scope of planning: legislation, metropolitan development, advocate planning, national urban policy, urban affairs, education, transportation, state planning, federal programs, pollution, AIP chapters, land use, public facilities and natural resources. Their body of knowledge includes scientific reports, privately published materials generated in the Southeast Michigan area, the entire resources of the former Transportation and Land Use Study and the Regional Planning Commission, as well as documents from the State of Michigan and local area governments.

Publications include the AIP Journal and the AIP Newsletter. There are various subscription costs. In some cases, member costs are discounted. Reproduction of documents are provided at photocopy cost. Inquiries may be phoned or written.

9. New County, USA Center
National Association of Counties
1001 Connecticut Avenue, N.W.
Washington, D.C. 20036

(202) 628-4701

Rodney L. Kendig is the Director of New County, USA Center which comprises the NACO Living Library. A staff of four professionals and two non-professionals utilize the approximately 300 documents of the Living Library and daily contacts with county officials and other public interest groups, research and citizen organizations and academia, as well as the Center's extensive files on county improvement and modernization programs who handles inquiries from county officials, planners, students and citizen' groups about ongoing and completed county improvement programs. The Center provides research documents, technical assistance to counties, on-site consultation services to its subscribing counties.

Key studies on county environmental achievements can be obtained from the Living Library at duplication cost.

10. National League of Cities/U.S. Conference of Mayors
Library Reference and Inquiry Service
1612 K Street, N.W.
Washington, D.C. 20036

(202) 293-7375

A staff of fifteen, including six professionals is headed by William Smith and operates a reference and inquiry service along with the regular services provided by the NLC/USCOM Library. Staff members will answer questions on any aspect of municipal affairs. City and State legislation, government and administration, citizen participation, community development, education, environmental quality, health, housing, intergovernmental relations, manpower, public safety, revenue and finance, transportation and international municipal cooperation are recognized categories of knowledge in which the service maintains current information about ongoing and completed projects and studies.

The Library contains over 30,000 books and reports, 800 periodicals and various municipal codes and city reports, Census data, State Leagues of Cities reports and biographies of selected mayors. The holdings are gathered from typical library sources as well as from the Federal Government, local governments and public interest groups.

The Library publishes an Index to Municipal League Publications monthly and abstracts the articles from its 800 periodicals weekly in Urban Affairs Abstracts. The inquiry responses are documented and references are provided for further or more indepth information.

The Library and Reference Service is designed to meet the needs of city government researchers and officials, but the staff members will answer inquiries from federal government agencies, school districts, civic groups and some private individual requests as their time and work load permit. Typical users are staff of the National League of Cities/U.S. Conference of Mayors, state leagues of cities, city officials, civic groups, federal agencies and state governments.

Requests may be phoned or written.

11. Management Information Service
International City Management Association
1140 Connecticut Avenue, N.W.
Washington, D.C. 20036

(202) 293-2200

The Management Information Service, headed by Walter Webb, accumulates files from city documents, operations, personnel and budget manuals and utilizes ICMA library facilities as well as contacts with member cities and other professional management organizations to answer inquiries on any management oriented problem from its subscribers and contract purchasers. Its holdings of city documents approximates 10,000 reports. While there are three full-time professionals handling such inquiries, the full resources and expertise of the International City Management Association are at their disposal.

Users are restricted to subscribers to MIS and private research organizations and universities which have purchased services under contract. Subscription fees are based on the size of a city's population.

Requests for information may be phoned in or written and an acknowledgment estimating the length of time required for a full response will be sent within 48 hours.

12. Urban Technology Clearinghouse
Public Technology, Incorporated
1140 Connecticut Avenue, N.W.
Washington, D.C. 20036

(202) 833-9484

C. Nelson Hay is in charge of the design of a clearinghouse operation to apply technological advancements and improvements to the needs of state and local governments. The clearinghouse will define and describe the problems to be addressed and will interface with industrial, governmental, and institutional resources for solutions.

Plans for the program to become operational are tentatively set for Spring, 1973.

13. American Institutes for Research (AIR)
Center for Research in Social Systems (CRESS)
10605 Concord Street
Kensington, Maryland 20795

(301) 933-3115

Mr. Preston S. Abbott is the director of this center which has a staff of approximately 25 information and library professional; 35 clerical and non-professional. Areas covered include social and behavioral sciences such as area studies, urban problems, and interdisciplinary research. Monographs, journal articles and government technical reports are abstracted by professional staff and indexed according to CRESS-developed Thesaurus of Social Science Index Terms. Bibliographic and analysis services are available on a fee basis according to specifically framed request; other services available by appointment only.

14. American Medical Association (AMA)
Archive-Library
535 North Dearborn Street
Chicago, Illinois 60610

(312) 527-1500
TWX 910-221-1300

Dr. Susan Crawford is the director of the Archive-Library. The Archive-Library is concerned with medicine, including the history of medicine, organized medicine, and sociological and economic aspects of medicine. Data are obtained on a continuous basis from published literature and internally generated documents. Holdings are extensive and include books, articles, and non-print materials.

Services include the following: data collection and analysis; depository; interlibrary loan; manual literature searching; reference and referral services; research; SDI services; state-of-the-art compilation. Medical Socioeconomic Research Resources is also available on a subscription basis.

15. Ecology Forum, Inc.
Environment Information Center (EIC)
124 East 39th Street
New York, New York 10016

(212) 685-0845

Mr. James G. Kollegger is President of EIC, Inc. The Environment Information Center (EIC) is a computer-assisted central data bank which gathers, indexes, abstracts, analyzes, and disseminates information on environmental matters. EIC monitors abstracts and cross-references information appearing in a large number of scientific, trade, and general periodicals. EIC makes this information available to subscribers in publication form (Environment Information ACCESS) or through computer searches and bibliography assemblies requested by mail or telephone order. Environmental issues covered include air, noise, land pollution; wildlife's geophysical change; energy; recreation; transportation; population control; ecological imbalance. Environment Information ACCESS includes descriptions of books, periodicals, conferences, legislation; special focus on one subject in each issue, available by yearly subscription. Various other reports are issued on an irregular basis. Many items appearing in ACCESS are available in microfiche or hard copy form on a single item or a subscription basis.

Assistance can be given in locating special items, assembling data or bibliographies, and obtaining literature surveys and summaries.

16. Joint Council on Economic Education (JCEE)
1212 Avenue of the Americas
New York, New York 10036

(212) 582-5150

Dr. M. L. Frankel is President of JCEE. JCEE serves as a clearinghouse for ideas, people, programs, and material that can effect economic understanding. It provides newsletters to various audiences and is available to help with any economic education program or suggest new efforts. Publications include *Journal of Economic Education* and several newsletters. Publications are intended for several levels: elementary, junior high, senior high, college, and general bibliographies as well as films. Workshops are also sponsored.

17. National Council on Crime and Delinquency
Information Center on Crime and Delinquency (ICCD)
345 Park Avenue
New York, New York 10022

(212) 254-7110

Mr. Eugene Doleschal is Acting Director of ICCD. *Information Center on Crime and Delinquency* (ICCD) maintains the world's largest library on crime and delinquency. The Center compiles bibliographic references and abstracts with emphasis on research and on innovative and promising programs and proposals. In addition to abstracting and information processing, the staff evaluates, synthesizes, and disseminates information on given topics. Scope of coverage is concerned with prevention, control, and treatment of crime and juvenile delinquency. Over 100 journals, 2,000 books, pamphlets, government documents, and fugitive literature are reviewed annually. A quarterly publication, *Crime and Delinquency Literature*, is available by yearly subscription. Literature searches and state-of-the art compilations are done by the staff.

18. New York Times Company
Information Bank
229 West 43rd Street
New York, New York 10036

(212) 556-1234

Dr. John Rothman is the Director, Library and Information Services. The New York Times Information Bank serves as a centralized computer facility for the input, storage, and retrieval of information from *The New York Times* and other publications. Covered are political, economic, and social affairs from *The New York Times* and selected material from over 70 other publications. Holdings include the existing clipping library of *The New York Times* from the last fifty years in selected subjects; the total file comprises some 20 million clippings files under some 80,000 subject classifications and about 1,250,000 names. *The New York Times Index* is produced from the information bank. Demand bibliographies from data base can be requested. Source material are stored on microfiche produced by Microfilming Corporation of America, a subsidiary of The New York Times. Microfiche are available on request. Computer searches, reference service and SDI service are also available.

19. U.S. Bureau of the Census
Public Information Office
Room 2089, Building 3
Washington, D.C. 20233

(301) 763-7273

Mr. William Lerner is Chief of Data User Services Division. The Public Information Office coordinates and provides technical data and services to divisions of the U.S. Bureau of the Census and other agencies. It supports the Census Bureau as a general purpose statistical agency and collects, tabulates, and publishes a wide variety of data about the people and the economy of the United States. Weekly, monthly, quarterly, semiannual, and annual publications are available. Microfiche of most reports issued since January 1, 1968 is available in 4 by 6 inch format; 16mm microfilm of selected items is also available. Several categories of items are available on magnetic tape. Coding guides and geographic base files are available for most metropolitan areas.

20. University Microfilms
Direct Access to Reference Information (DATRIX)
300 North Zeeb Road
Ann Arbor, Michigan 48106

(313) 761-4700

Mr. Richard T. Wood is Group Product Manager. Direct Access to Reference Information (DATRIX) is a computerized information retrieval system employed to manipulate the file of dissertation references at University Microfilms. This file consists of approximately 185,000 references from some 250 volumes of Dissertation Abstracts, dating from 1938. All doctoral dissertations listed in Dissertation Abstracts from 1938 to date including 77 major subject and 119 minor subject areas are included. The program has recently been broadened to include some foreign universities in addition to the participating universities in the United States and Canada. Copies of the complete dissertations listed in the DATRIX base are available on 35mm microfilm roll or as xerographic hard copy.

Services are available on a fee basis; keyword lists are available for guidance in preparing an order.

21. University of North Carolina
Institute for Research in Social Science
Social Science Data Center
Manning Hall, Room 10
Chapel Hill, North Carolina 27514

(919) 933-1174 Extension 28

Mr. Richard Rockwell is Director of Social Science Data Library. The center maintains survey data in political science, anthropology, social welfare, sociology, and urban affairs. Specific collections included are the Harris Public Opinion Polls, Yale Human Relations Area Files, International Survey Library Association, Inter-University Consortium for Political Research, IRSS, Roper Public Opinion Research Center, Southeastern Regional Survey, and U.S. Census Data. Publications include various monographs, indexes, catalogs, and bibliographies. Services are available to users inside the organization and, for a fee, outside the Institute for Research in Social Science.

REPORTS FROM INFORMAL FORUM SESSIONS

Air Information Systems & Services

Peter Halpin
Applied Technology Division
U. S. Environmental Protection Agency

Our Informal Forum Session on Air Information Systems and Services did not produce any specific recommendations as such, nor was any material handed out, however many areas of concern were discussed. Specifically related to APTIC (in order of discussion, not necessarily in order of importance) were:

1. How can an outsider find out about existing EPA systems such as APTIC? (from directories and libraries including LC and its National Referral Center)
2. Turnaround time (currently 1 or 2 days within APTIC).
3. On-line capability (APTIC will soon have it for Regional Offices and some interested State control agencies, and will extend it to others as demand and resources warrant).
4. Overlap with NTIS (limited to federally-generated air pollution reports which are a small segment of NTIS, of APTIC, and of other collections. It is expected that the specialized information centers index and abstract in a way that is more specific to their users' needs).
5. Microform vs. photocopy preference (those who want to get their copies faster and/or store them in a compact way prefer microfiche, others prefer photocopies).
6. Market information (although APTIC selects mostly scientific and technical information, some have found it very useful for marketing information).

More generally, the following items were of recurring concern for this audience:

1. price which user can afford
2. overlap in coverage with other services provided by the same organization
3. availability on tape
4. coverage of Federal, State, and local regulations
5. coverage of *Federal Register* items
6. coverage of foreign material
7. coverage of State publications, hearings, etc.

8. how to get copies of items covered, or conversely how to live within the copyright law
9. cost of copies from services which provide them
10. coverage of on-going project information, interim reports, etc.
11. preference for publication of scope of work rather than synopses of air contracts in Commerce Business Daily in the future
12. possibility of EPA final and interim reports' distribution being restricted
13. confidentiality of requests to information centers
14. thesaurus development abreast of the subject complex
15. local government problems not always understood by Federal government (example was Bureau of Mines)
16. desirability of feedback to information centers

Twenty-seven (27) participants signed the attendance roster. I invited several outside systems and services to send representatives to describe them. Those who did were: POLLUTION ABSTRACTS, ENVIRONMENT INFORMATION ACCESS, INSTITUTE FOR SCIENTIFIC INFORMATION, BIOSIS and the AMERICAN PETROLEUM INSTITUTE. Others which were described were "Air Quality Control Digest", "Air Pollution Titles", and "Excerpta Medica".

A representative of a private organization shared the table with the session leader. A representative of a State air pollution control agency was invited; the session commenced promptly at the appointed hour and proceeded without benefit of his potential contribution(s).

Peter Halpin
APTIC

Pesticides: Information Systems and Services

Claudia Lewis
Publications and Information Section
U. S. Environmental Protection Agency

Approximately 25-30 individuals participated in the informal discussions on pesticides, representing users from several different Federal agencies, a local governmental agency, universities, two private Information Services, and one citizen-action group.

A brief presentation was made describing the general functions and responsibilities of the Publications and Information Section, Division of Pesticide Community Studies; how these functions evolved, and the users served. A history showing the various Federal organizations under which these activities have been carried out for the past 22 years was also given to provide participants with a better understanding of the total system.

A detailed description was then given of the pesticides literature collection, how it is maintained, the services that are available using this data base and other library resources, and plans for the further development of this data base. Copies of overhead projectuals and handouts used during the session are attached.

The presentations appeared to be well received with several participants commenting that it was very informative; approximately 10 individuals left specific information requests. One participant suggested that we publish some articles in the major scientific publications about this system.

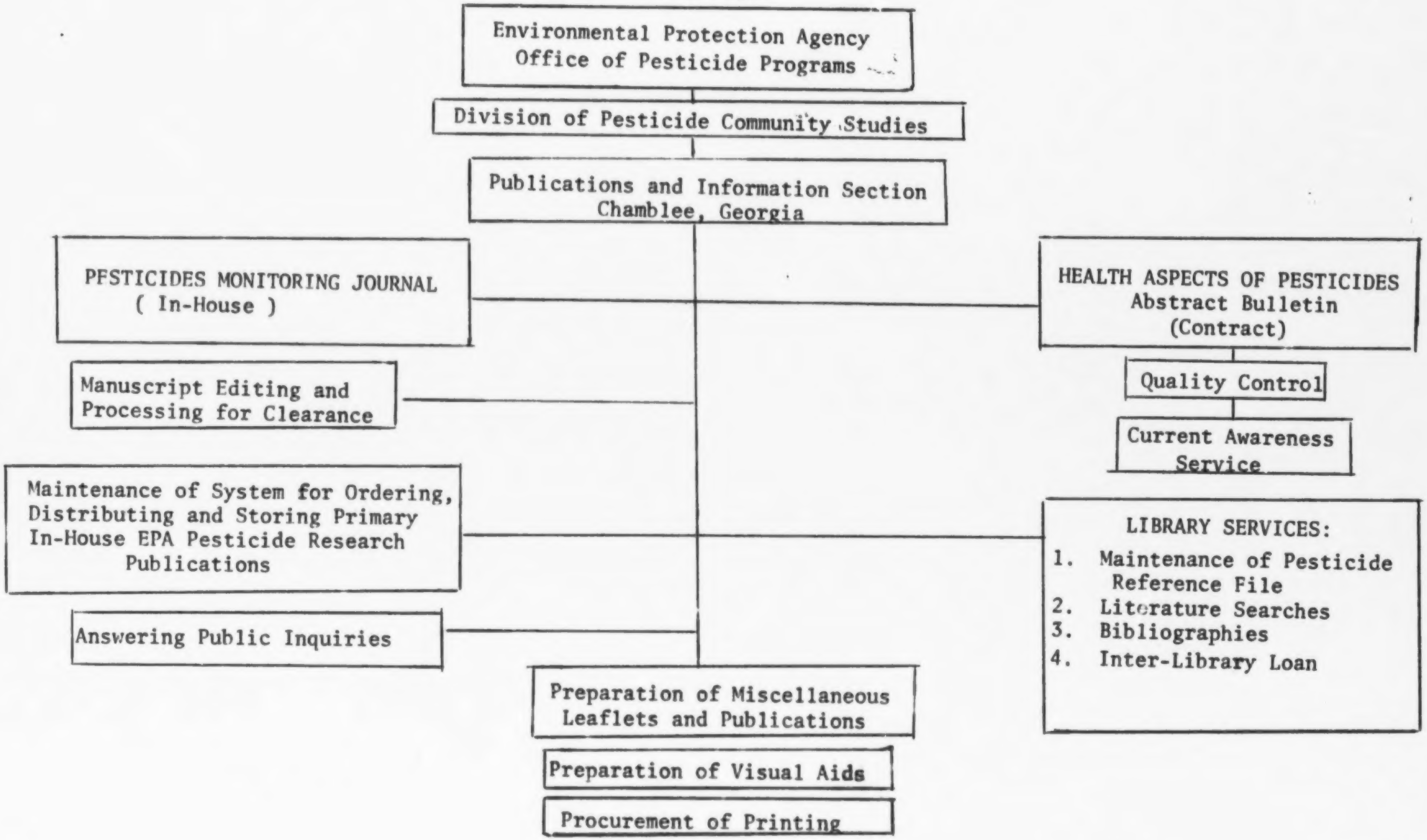
A discussion of the coverage of the literature in the _Health Aspects of Pesticides Abstract Bulletin_ led to a suggestion for giving consideration to expanding the coverage to enclose articles dealing with efficacy of pesticides and also other methods of pest control.

An EPA representative pointed out the importance of coordinating these pesticide information activities with those of the Pesticides Registration Division to permit users, in most instances, to obtain information from one contact point.

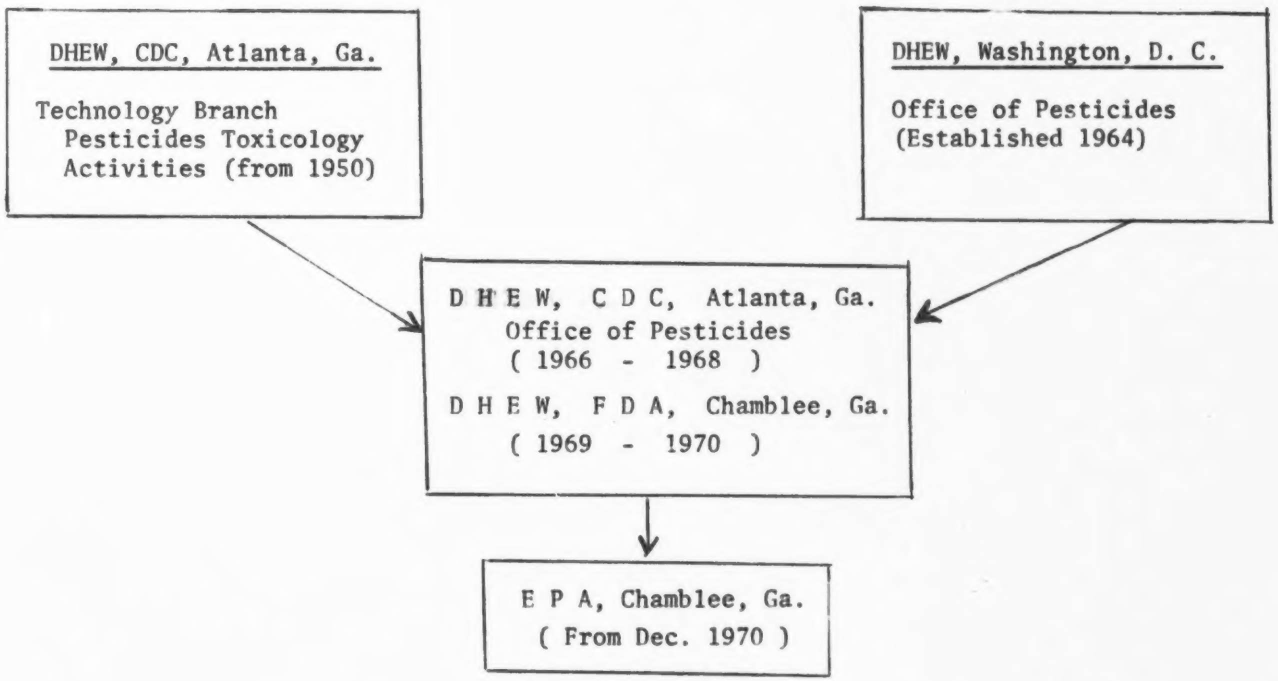
These were the only comments relating specifically to information activities of the Division of Pesticide Community Studies.

The discussion then turned to the subject of unpublished information present in the pesticide registration and petition files. The concensus was that this information should be made more readily available to interested users through encouragement of industry to publish their results more rapidly and widely and/or making the information available to the public under the "Freedom of Information" act. There was considerable discussion concerning the nature of "proprietary" information in pesticide registration and petition files, and whether it was possible to protect the rights of industry and at the same time meet the needs of the user.

Functional Chart
Publications and Information Section
Division of Pesticide Community Studies
Office of Pesticide Programs
Environmental Protection Agency
Chamblee, Georgia


Environmental Protection Agency
Office of Pesticide Programs
Division of Pesticide Community Studies
Publications and Information Section
Chamblee, Georgia
PESTICIDES MONITORING JOURNAL
(In-House)
HEALTH ASPECTS OF PESTICIDES
Abstract Bulletin
(Contract)
Manuscript Editing and
Processing for Clearance
Quality Control
Current Awareness
Service
Maintenance of System for Ordering,
Distributing and Storing Primary
In-House EPA Pesticide Research
Publications
LIBRARY SERVICES:
1. Maintenance of Pesticide
Reference File
2. Literature Searches
3. Bibliographies
4. Inter-Library Loan
Answering Public Inquiries
Preparation of Miscellaneous
Leaflets and Publications
Preparation of Visual Aids
Procurement of Printing

History of Parent Organizations of
Publications and Information Section
Division of Pesticide Community Studies
Office of Pesticide Programs
Environmental Protection Agency
Chamblee, Georgia



DHEW, CDC, Atlanta, Ga.

Technology Branch
Pesticides Toxicology
Activities (from 1950)

DHEW, Washington, D. C.

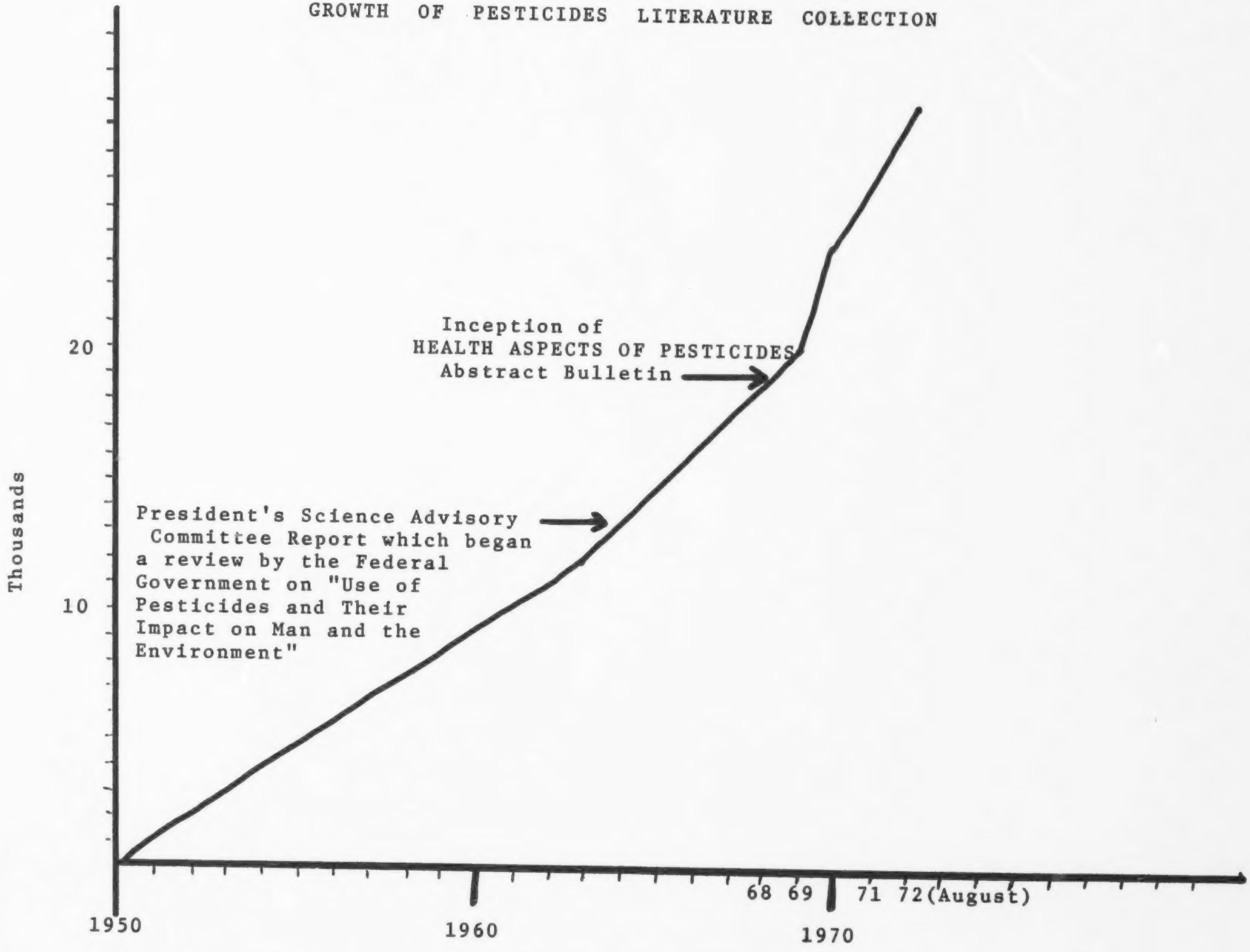
Office of Pesticides
(Established 1964)

DHEW, CDC, Atlanta, Ga.
Office of Pesticides
(1966 - 1968)

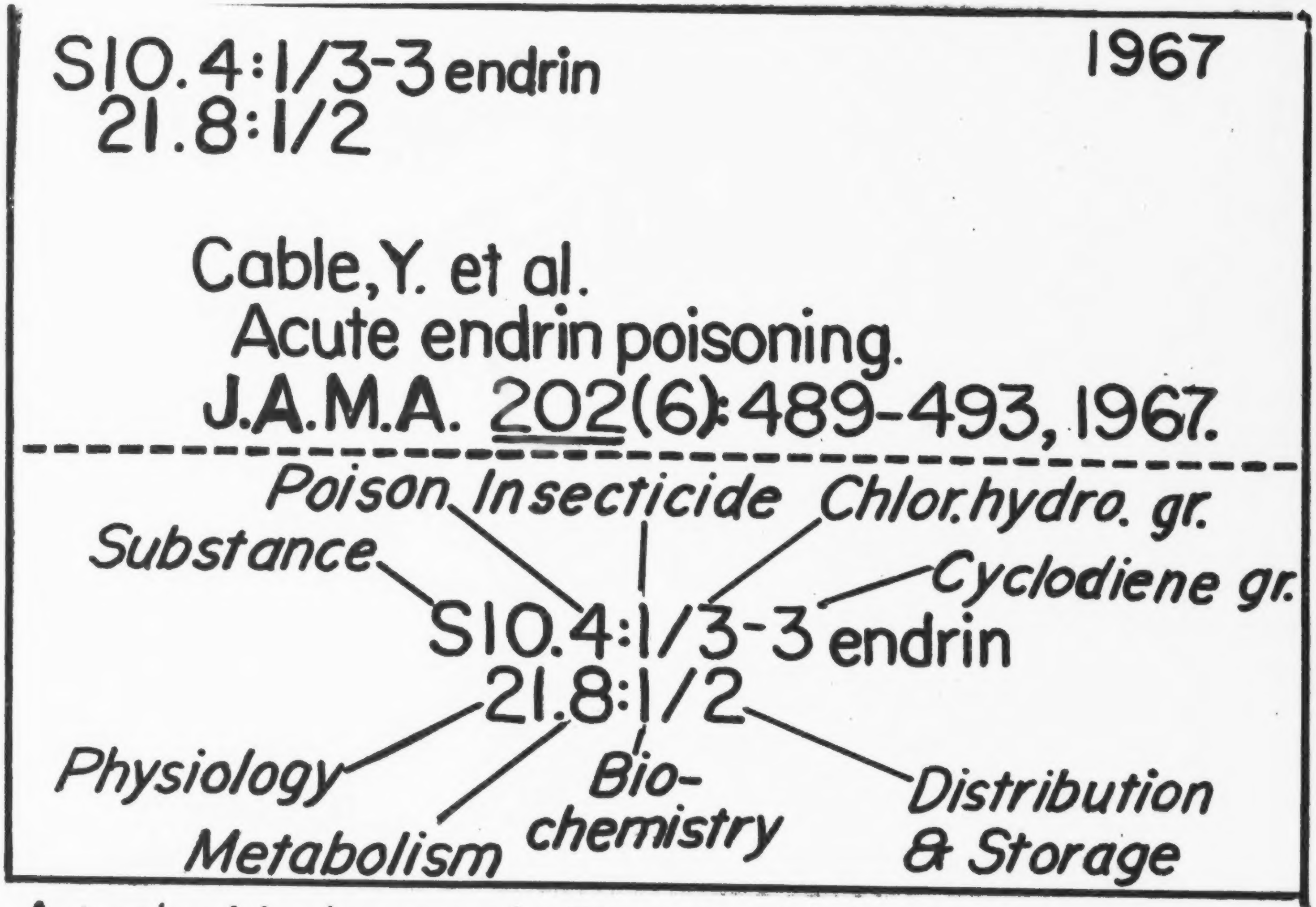
DHEW, FDA, Chamblee, Ga.
(1969 - 1970)

EPA, Chamblee, Ga.
(From Dec. 1970)

GROWTH OF PESTICIDES LITERATURE COLLECTION



Publications & Info. Sec. Div. of Pest. Community Studies, OPP EPA, Chamblee, Georgia



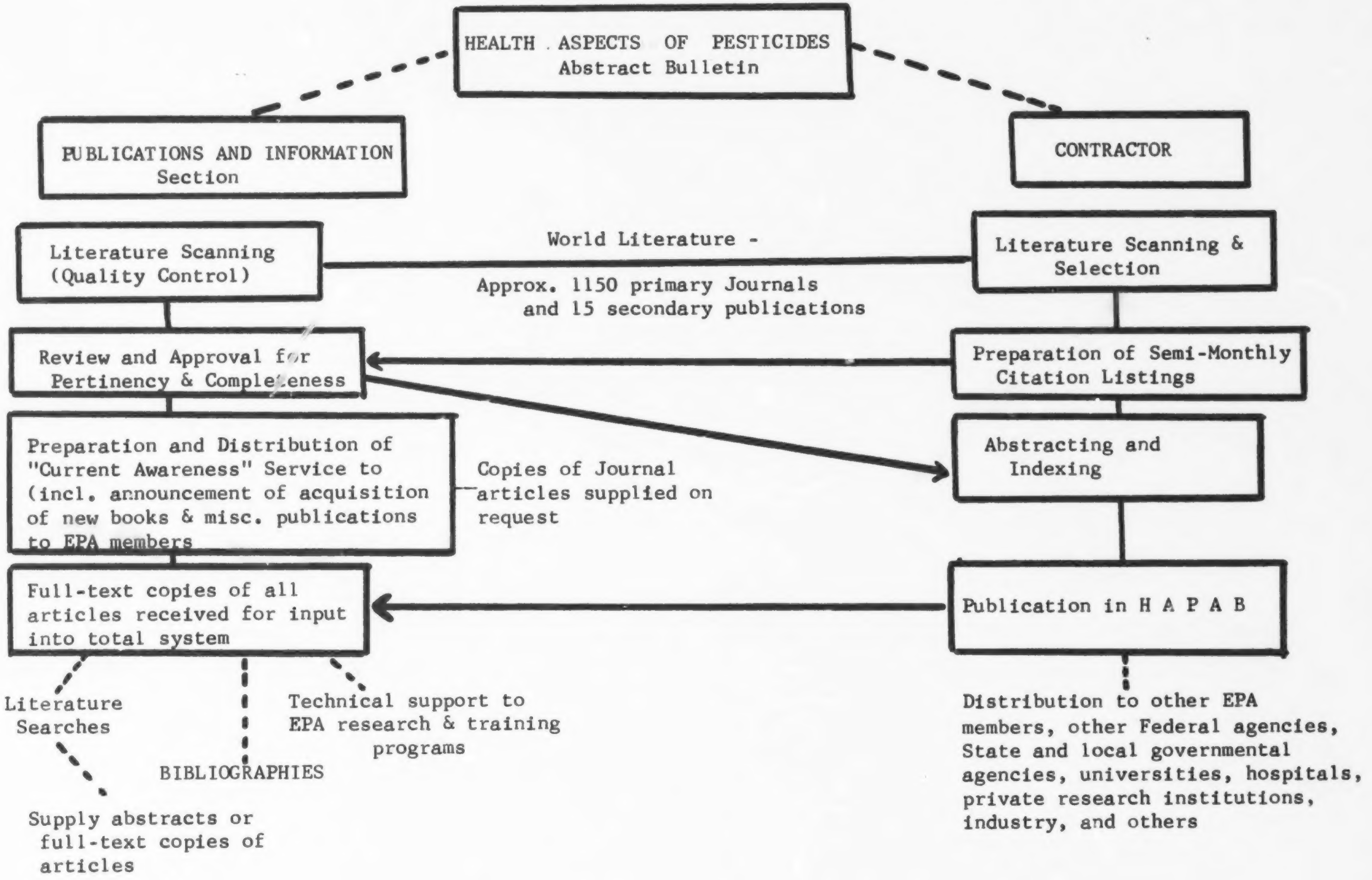
S10.4:1/3-3 endrin
21.8:1/2

1967

Cable, Y. et al.
Acute endrin poisoning.
J.A.M.A. 202(6):489-493, 1967.

Poison
Insecticide
Chlor.hydro. gr.
Substance
Cyclodiene gr.
S10.4:1/3-3 endrin
21.8:1/2
Physiology
Bio-chemistry
Distribution & Storage
Metabolism

A typical index card. The portion below the broken line is not a part of the card but has been added to explain the subject classification

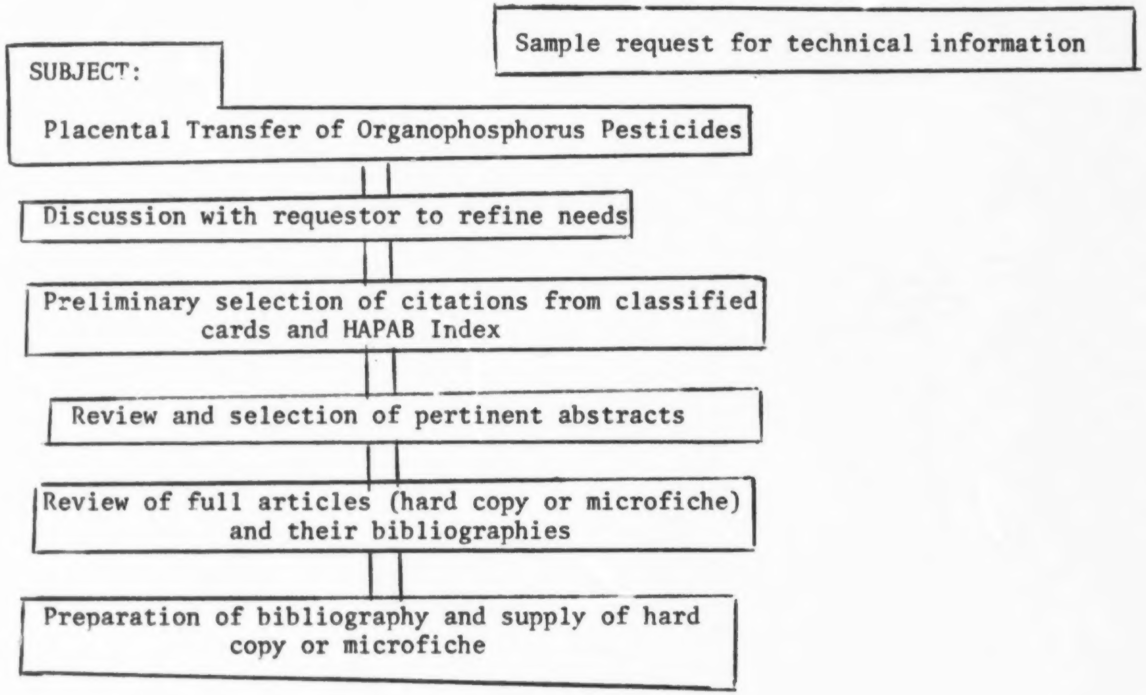

HEALTH ASPECTS OF PESTICIDES Abstract Bulletin
PUBLICATIONS AND INFORMATION Section
CONTRACTOR
Literature Scanning (Quality Control)
World Literature -
Approx. 1150 primary Journals and 15 secondary publications
Literature Scanning & Selection
Review and Approval for Pertinency & Completeness
Preparation of Semi-Monthly Citation Listings
Preparation and Distribution of "Current Awareness" Service to (incl. announcement of acquisition of new books & misc. publications to EPA members
Copies of Journal articles supplied on request
Abstracting and Indexing
Full-text copies of all articles received for input into total system
Publication in H A P A B
Literature Searches
BIBLIOGRAPHIES
Technical support to EPA research & training programs
Supply abstracts or full-text copies of articles
Distribution to other EPA members, other Federal agencies, State and local governmental agencies, universities, hospitals, private research institutions, industry, and others

Publications & Info. Sect., Div. of Pest. Community Studies, OPP, EPA, Chamblee, Ga.

Procedures for Handling Typical Requests for Information

A.	B.	C.	D.
Telephone requests for specific items of information 1. Identification of compound 2. Uses of compound 3. Current restrictions	Written public inquiries concerning various areas related to pesticide usage, from other Federal agencies, State and local governmental agencies, universities, hospitals, environmental groups, students, general public, etc.	Technical Requests (principally EPA personnel) via phone or letter that require a search and preparation of bibliography or supply of hard copy.	Full Bibliographies on individual compounds for EPA Internal Review
Avg. Response Time: Immediate	Avg. Response Time: 10 days	Avg. Response Time: 1 day to 4 weeks	Avg. Response Time 3 weeks or as scheduled
Information available in textbooks, compendiums, working files and data books Questions answered by phone immediately or within a few hours	Form letters for typical requests Selection of In-house reprints and brochures, excerpts from pesticide manuals, references to extramural publications, etc. Referral to other parts of EPA or other agencies	Discussion with requestor to refine needs Selection of articles from classified cards and/or HAPAB Preparation of Bibliography and/or Supply of Hard Copy and/or Oral Response	Selection of article from classified cards and HAPAB Preparation of Bibliography (may range from 20-400 citations)

Publications & Info. Sect., Div. of Pest. Community Studies, OPP, EPA, Chamblee Ga.


Sample request for technical information
SUBJECT:
Placental Transfer of Organophosphorus Pesticides
Discussion with requestor to refine needs
Preliminary selection of citations from classified cards and HAPAB Index
Review and selection of pertinent abstracts
Review of full articles (hard copy or microfiche) and their bibliographies
Preparation of bibliography and supply of hard copy or microfiche

Solid Waste: Information Systems and Services

John A. Connolly
Technical Information Officer
Solid Waste Information Retrieval Services Branch
U. S. Environmental Protection Agency

The first item discussed was the Information Retrieval Services Branch, specifically the Solid Waste Information Retrieval System (SWIRS), and its relationship to Technical Information Staff (TIS) as well as its future plans for dissemination of information to non-EPA users.

Mr. Clyde Dial, Director of the Systems Management Division of OSWMP, described the National Solid Waste Data Network, and the availability and degrees of analysis of the information in the data bank.

The 30 attendees were receptive and inquisitive about the types of services they could look forward to from EPA's solid waste management information systems.

Radiation Information Systems and Services

J. R. Buchanan

The session on Radiation Systems and Services was attended by a small group of very interested participants. Discussions continued past the 2 hours alloted.

Background

Radiation information is inevitably concerned with the transport and disposition of radioactivity in the environment. Radiation problems are compounded by the large number of radioactive species that are associated with the fission process, as well as the vast range of relative hazards associated with each, their relative mobility in the inorganic environment, and their behavior in various ecological systems (food chains). In view of the fact that the Atomic Energy Act of 1954 charged the U.S. Atomic Energy Commission both with the development of nuclear energy and the protection of the health and safety of the public, it is not surprising that the AEC plays a predominant role in those information programs oriented toward radiation effects. The AEC sponsors 75% of the programs supported by the federal government that are directly concerned with radiation. However, radioactivity can pollute any environment and is also a factor in mission-oriented programs, which in turn must be responsible for environmental effects. Hence, in addition to the AEC, it is not surprising that there are many other information programs, both discipline- and mission-oriented, which are concerned to some degree with radiation effects. Of these other information programs outside the AEC, the most noteworthy are those of the Public Health Service and, in particular, the Bureau of Radiological Health. This Bureau supports at least three field laboratories, has ongoing radiation surveillance programs, and publishes frequent state-of-the-art reports on various radiological health problems.

Specific Sources of Information

Federally supported centers concerned with radiation were identified by extracting information on such programs from the SEQUIPS report. This was made available to the attendees in a table which was distributed at the meeting. The table (attached) divides the information programs into three categories and further subdivides the first two on the basis of the level of effort in each program devoted to radiation phenomenology. The first category lists those information programs which are primarily concerned with radiation; the second category lists those information activities which are primarily concerned with other environmental phenomena but which are concerned to some degree with radiation; and the third category lists the major governmental document storage and retrieval systems (not already listed in the first two, but which include radiation literature). More detailed information on all of these programs is contained in the SEQUIPS report in a table which identifies the subject coverage of existing environmental information systems and in another table which identifies the capabilities of existing environmental information systems. There were questions on the capabilities of several of the centers from the attendees. Discussions followed based on the experience of various users.

Questions Posed by Moderator

Several questions were posed to the attendees by the moderator. Based on discussion there and subsequent to the informal session, some tentative answers are evident. They are as follows:

(1) Where should existing information systems concentrate their resources, i.e., on what kind of services?

(Answer) The storage of information and the ability to answer questions are basic to an information center. Other services, such as SDI, newsletters, special topical bibliographies, journals, and state-of-the-art reports round out the complete center. Whether or not any of these services are provided depends on the financial resources of the center and the needs of it's particular clinentele. Reports in the nature of the state-of-the-art monograph make the greatest overall contribution to technology. However, when there is a reduction in effort, it usually reflects most heavily on the center's production of reports. This was felt to be undesirable and it was recommended that each center maintain some level of effort on reports if at all possible.

(2) Are more radiation centers needed? If so, in what subject areas? (Answer) It was felt that the total subject matter is generally well covered by the existing information services. It was also suggested that the National Library of Medicine should be added to the attached list of activities furnishing radiation information.

(3) Are the centers exercising adequate quality control over their output? What could be done to improve quality?

(Answer) Generally they do. Areas in which there could be some improvement are (A) tighter control over what goes into the storage file, i.e., screening out more of the information of only marginal value; (B) consistent indexing among various specialists in the same subject area; and (C) feedback from peers and users on the usefulness and overall quality of various center products.

(4) Are the centers and their services adequately known to potential users? Conversely do the centers overstate their services, i.e., do they provide less that one would expect from their brochures and other advertising?

(Answer) Every center should devote some small effort to publicizing its services in order to reach potential new users. It was also felt that the centers should be careful in their brochures and other forms of publicity not to overstate the extent of the services provided. Some users felt that a few of the centers in the various information resource directories should not be listed. It was concluded that tighter control over the organizations included should be maintained by the compilers of such directories.

Conclusions

To a degree, information systems and services on radiation, as well as other aspects of nuclear energy, are more advanced than other areas of technology concerned with pollution. No problems specific to the processing of radiation information were identified. In fact, the discussions of possible problems dealt entirely with those of a general nature.

Information and Data Programs Concerned with Environmental Pollution by Radiation[*]

I. Information Programs Oriented to Problems of Radiation Effects on the Environment

A. Major Programs (based on level of effort on radiation effects on the environment)

1. Bureau of Radiological Health (52)
   Office of Information
   U.S. Environmental Protection Agency
   12720 Twinbrook Parkway
   Rockville, Maryland 20852

2. Nuclear Safety Information Center (51)
   Oak Ridge National Laboratory
   P. O. Box Y
   Oak Ridge, Tennessee 37830

3. Technical Information Center (16)
   U.S. Atomic Energy Commission
   P. O. Box 62
   Oak Ridge, Tennessee 37830

B. Minor Programs (smaller, more specialized programs than "A")

1. Ecological Information Analysis Center (18)
   Battelle Memorial Institute
   Columbus Laboratories
   505 King Avenue
   Columbus, Ohio 43201

2. Ecological Sciences Information Center (6)
   Oak Ridge National Laboratory
   P. O. Box X
   Oak Ridge, Tennessee 37830

3. Environmental Mutagen Information Center (25)
   Oak Ridge National Laboratory
   P. O. Box Y
   Oak Ridge, Tennessee 37830

4. Information Center for Internal Exposure (37)
   Oak Ridge National Laboratory
   P. O. Box X
   Oak Ridge, Tennessee 37830

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[*] Extracted from "A Study of Environmental Quality Information Programs in the Federal Government," Report of the SEQUIP Committee to the Office of Science and Technology, Executive Office of the President, May 1971 (to be published).

5. Nevada Applied Ecology Information Center
U.S. Atomic Energy Commission
P. O. Box 14100
Las Vegas, Nevada 89114

II. Information Programs Supporting Mission Agencies

A. Direct Interest in Pollution by Radiation

1. Air Resources Laboratories (4)
National Oceanic and Atmospheric Administration
8060 13th Street
Silver Spring, Maryland 20910

2. Removed at request of U.S. Air Force

3. Environmental Information System
National Science Foundation Environmental Program
Oak Ridge National Laboratory
P. O. Box X
Oak Ridge, Tennessee 37830

4. SAROAD (Storage and Retrieval of Air Quality Data) (67)
Air Pollution Control Office
U.S. Environmental Protection Agency
5725 Dragon Way
Cincinnati, Ohio 45227

5. Scientific Information and Documentation Division (63)
National Oceanic and Atmospheric Administration
Rockville, Maryland 20852

6. Water Resources Scientific Information Center (74)
U.S. Department of the Interior
Washington, D. C. 20204

B. Less Direct Interest in Pollution by Radiation

1. Bureau of Commercial Fisheries
U.S. Department of the Interior
Washington, D. C. 20204

2. Center for Short-Lived Phenomena (9)
Smithsonian Institute
60 Garden Street
Cambridge, Massachusetts 02138

3. Division of Technical Reports (17)
Bureau of Mines
U.S. Department of Interior
Washington, D. C. 20240

4. Environmental Hygiene Agency (24)
U.S. Army
Edgewood Arsenal, Maryland 21010

5. Federal Water Quality Technical Information and
Management Planning System (32)
Crystall Mall, Building 2, Room 1108
Jefferson Davis Highway
Arlington, Virginia

6. Maritime Environmental Protection Program (40)
Commandant (OLE) U.S. Coast Guard
400 7th Street, S.W.
Washington, D. C. 20591

7. National Climatic Center (44)
National Oceanic and Atmospheric Administration
Federal Building
Asheville, North Carolina 28801

8. National Institute of Environmental Health Science (38)
Information Storage and Retrieval Section
U.S. Environmental Protection Agency
P. O. Box 12233
Research Triangle Park, North Carolina 17709

9. National Oceanographic Data Center (47)
National Oceanic and Atmospheric Administration
Rockville, Maryland 20852

10. Sanitary Science Division (60)
U.S. Army Mobility Equipment Research and
Development Center
Fort Belvoir, Virginia 22060

11. Water Resources Council (72)
1025 Vermont Avenue, N.W.
Suite 900
Washington, D. C. 20005

III. Broad Document Storage and Retrieval Systems

1. Defense Documentation Center (14)
Cameron Station
Alexandria, Virginia 22314

2. National Referral Center (61)
Library of Congress
2nd and Independence Avenue
Washington, D. C. 20504

3. National Technical Information Service (48)
U.S. Department of Commerce
5285 Port Royal Road
Springfield, Virginia 22151

4. Science Information Exchange (62)
   Smithsonian Institute
   1730 M Street, N.W.
   Washington, D. C. 20036

5. Science and Technology Division (61)
   Library of Congress
   2nd and Independence Avenue
   Washington, D. C. 20504

Environmental Subject Category Listing

Phil Arberg

A number of librarians and information scientists involved in the handling of environmental report literature had expressed concern over the NTIS category structure for environmental reports. A meeting was called on June 15, 1972, to begin discussion of a revised category structure which could be recommended to NTIS. Attendees at the meeting consisted of the following:

Phil Arberg
Office of Research
and Monitoring
EPA

Mr. David Bach
Office of Noise
Abatement
EPA

Mr. Alain R. Carr
Environment Information
Center, Inc.

Mr. Robert Ceder
Office of Pesticides
EPA

Mr. Logan Cowgill
U.S. Department of Interior

Mr. Robert Freeman
National Oceanic & Atmospheric
Administration

Mr. Morton Friedman
National Environmental Research
Center, EPA

Mr. James Wheatley
Smithsonian Science Information
Exchange

Mr. Neal Whitney
Management and Organization
Division, EPA

Mr. Allen F. Joseph
Oak Ridge National Laboratory

Mr. George Kudravitz
National Technical
Information Service

Mrs. Claudia Lewis
Division of Pesticide
Community, EPA

Mr. Roy Stamm
National Technical
Information Service

Mr. Bruno M. Vasta
National Library of Medicine

Mr. Paul Fuschini
Solid Waste Information
Retrieval System, EPA

Miss Ruby Gill
Solid Waste Information
Retrieval System, EPA

Mr. Neil Haley
Management Information
Systems Division, EPA

Mr. Peter Halpin
Air Pollution Technical
Information Center, EPA

Mr. Harry J. Hamilton
Oak Ridge National Laboratory

Mr. Howard Howell
Management Information
Systems Division, EPA

A draft category structure was assembled out of the discussions at the June 15th meeting. This was circulated to the attendees for review and comments. Changes were incorporated into a draft which was then presented at the Informal Forum Session for discussion. The proposed category structure, approved at the forum session, is attached.

NOTE: NTIS accepted the recommendations, except for the removal of ecology as a separate term in 57H. The new category 68 is reflected in the weekly Environmental Pollution and Control for March 5, 1973.

RECOMMENDED CATEGORY 68 STRUCTURE

68. Environmental Pollution and Control

   a. Air Pollution and Control
   b. Noise Pollution and Control
   c. Solid Wastes Pollution and Control
   d. Water Pollution and Control
   e. Pesticides Pollution and Control
   f. Radiation Pollution and Control
   g. Environmental Health and Safety
   h. Environmental Impact Statements

OVERALL RECOMMENDATIONS

1. All EPA reports must be categorized within the appropriate subcategory of 68.

2. Remove ecology as a separate term (57H).

3. The laws in category 56 should be categorized to the appropriate subcategory in category 68.

4. The public administration and political science in category 56 that deals with pollution should be cross referenced to category 68.

5. Cross reference economics, business and commerce to the appropriate subcategory of 68, when they deal with environmental pollution.

PESTICIDES. In addition to a subcategory 68e, the following cross references are recommended.

57 - Biological and Medical Sciences
Cross reference Pest Controls, and Toxicology to category 68.

52 - Agriculture and Food
Cross reference Agricultural Chemistry, Agricultural Products Processing, Fisheries and Agriculture, Natural Resources and Wildlife Management.

78 - Ocean Sciences and Engineering
Cross reference from biological oceanography and chemical oceanography.

AIR. No separate recommendations other than in general.

SOLID WASTES. No separate recommendations.

NOISE. Primarily concerned that following cross references occur: (53B)

a. Cross reference land use and zoning to 68b.

b. Cross reference public health, hygiene and industrial medicine - stress psychology to 68b and 68g.

c. Cross reference industrial engineering to 68b.

d. Cross reference acoustics to 68b.

e. Cross reference psychology and psychometrics to 68g.

f. Cross reference building (89) to 68b.

RADIATION. Primarily concerned with having following cross references references:

a. Cross reference radiation shielding, protection and safety to 68f and 68g.

b. Cross reference radioactive wastes, fission product and radioactive fallout to 68f and g.

c. Cross reference reactor engineering and nuclear power plants (only in relation to site location).

d. Cross reference 57V Radiobiology to 68g.

WATER. Primarily concerned with assurances of cross references as follows:

a. Cross reference Civil, structural and marine engineering to applicable 68 subcategory.

b. Cross reference industrial and mechanical engineering (60) to applicable 68 subcategory.

c. Cross reference, ocean sciences and engineering (78) to applicable subcategory.

d. Cross reference transportation to applicable 68 subcategory.

ENVIRONMENTAL HEALTH AND SAFETY. To be established as its own subcategory 68g.

Though not specifically limited to environment, these categories represent an area where specific assurance of cross references is necessary.

LAND USE.

Cross reference 53B to appropriate category of 68.

METHODS, INSTRUMENTATION, AND EQUIPMENT

Cross reference all methods, instrumentation and equipment that measure or monitor environmental pollutants.

SAFETY ENGINEERING AND PROTECTION

Cross reference to 68g.

EARTH SCIENCES

Mineral Industries (when dealing with strip mining, mine drainage, etc) should be cross referenced to category 68.

Dolores Gregory
EPA Office of International Activities

International Exchanges

1. Experiments in International Exchanges

The proposed UN referral service, designed to create world-wide linkages among existing information services, documents centers and libraries, would be strengthened if participating countries share ideas and experiences during the development stages of their own information systems. Bilateral documents exchanges, initiated between EPA and central environmental agencies in other countries, can provide valuable experimentations in collection, processing and dissemination of foreign documents.

Pilot scale arrangements for information sharing permit continual evaluation of needs and uses as well as improved operational procedures such as transmittal and translations of documents. The bilateral efforts should be designed to fit within an over-all system to be implemented by the UN.

2. New Communication Networks

Communication among scientists and engineers on the international level is aided by a multitude of information services derived from the world literature (abstracts, bibliographics, etc.). Similar communication networks must be developed for rapid exchange of ideas and experiences among policy levels (both legislative and executive) and among managers of environmental programs ranging from community services (solid waste disposal, sewage treatment, etc.) to industrial wastes treatment facilities or processes. Communication techniques which might be tested include an international news service (patterned after the news wire services) to alert people in one country to events in other areas, technology applications clearing houses (similar to that run by the Public Technology Inc.), regional centers for cataloging "best practices" technology adopted by various countries for control of pollution.

3. "Centers of Strength"

Informal agreements among countries to share the use of information services could permit different countries to concentrate on different areas leading to a series of "centers of strength" for information (e.g. environmental law, industrial wastes treatment, water resources management, community wastewater treatment, etc.).

This session is to be informal with no prepared talks or program, in the hope that each person will contribute thoughts on how the international flow of environmental information can be improved. Each person will speak as an individual, not representatives of an organization or country. Ideas which come out of our talks can be fed back to national and international organizations as considered appropriate.

Based on our experience at EPA where requests for information abound, we would like to share with you some thoughts on types of information needed and suggest one or two possible approaches for meeting the urgent demands for information.

Gaps in Communication System

The published literature, supplemented by national information services and documents centers, cover scientific and technical developments in environmentally-related fields-ranging from basic ecological studies to technology for control of pollution.

There is not, however, a similar world-wide communications network for such information as:

Governmental actions to control pollution (laws, standards, regulations)

Organization of governmental efforts to improve environment (structure and functions of national and local agencies)

Innovations in management of community services (solid wastes, sewage) and land use planning

Innovations in industrial wastes control

Advanced methodologies applied to manpower planning

Information systems that would enable countries to share ideas and experiences rapidly could contribute greatly to better planning of environmental programs on the governmental and community levels and more effective use of manpower and financial resources in pollution control efforts.

Communications Systems

The range of users -- citizens groups, legislators, design engineers, program managers, city officials, etc. -- has stimulated numerous "packaging and marketing" efforts on the national level. Innovation in international exchanges might occur through, for example an international environmental news service.

Patterned after a news wire service with correspondents feeding items into a central editorial office and articles sent back through a network of teletypers, a system for quick reporting of country actions (new appointments, creation of new agencies, highlights of new legislation or regulations, or other news-worthy events) might be developed under UN auspices. All countries could feed information into the system through a network of correspondents designated by national environmental organizations. Edited articles could then be redistributed for use by the recipient countries/organizations/groups in whatever format they found useful -- e.g. their own newsletters, a series of bulletins to alert different groups about activities of direct interest to them.

Also several countries might pool efforts in an informal basis to design and test other communication mechanisms. EPA, for example, needs information on regulations in other countries for use in its own standard setting exercises.

Use of this information by EPA staff will be approached from several directions -- English language summaries, monthly lists of foreign documents received, computerized search system, subject area highlights, and so on. User feedback will encourage continual improvements in the information gathering and processing system. This experience in improving communication can be shared with agencies in other countries which have standard-setting functions. Similarly, communication experiments in other areas -- pollution control technology, manpower planning, public education, environmental management (urban services, land use, power plant siting) might be designed by other countries.

Collaboration could lead to (1) better sharing of ideas and experiences (2) a network of "centers of strength" in different areas of environmental information (3) agreements on information processing methods and formats to facilitate exchanges of documents.

Jean Circiello

U. S. Environmental Protection Agency

The points listed below represent the consensus at a Monday night meeting of 50 librarians, which included people from industry, universities, schools, citizen action groups, municipal state and federal government and public and depository libraries.

A. We concur with the idea of providing a decentralized system to coordinate environmental information sources. The responsibilities of this system should include:

1. Identifying the various gaps in the current environmental information fabric, and encouraging relevant agencies to fill in these areas.

2. Preparation of a Directory of Environmental Information Sources, Collections and Systems, with provision for updating. Directory should be responsive to needs of all environmental information users from Citizen Action groups to computer programming as they are represented at NEIS, and should be more comprehensive than SEQUIP.

B. Environmental Information Referral centers should be designated regionally, as a primary contact point for users. This should be accomplished by strengthening some existing centers and supplying them with sufficient and competent staff. Centers should be informed about the needs of all environmental information users and be sympathetic to them.

Once these centers have been designated, their existence must be publicized both to the environmental information user community and to the standard information centers, i.e.

Public and academic libraries (Thru National Commission on Libraries.)

Federal Information Centers.

C. Those documents which are created through the government and are distributed on sale should be handled by the existing agencies (GPO and NTIS) and, where necessary, these should be strengthened. New agencies should not be established.

D. When the government creates information or data in a computerized form, special efforts must be made to assure that the expense of gaining access to these systems (terminals, machine time, etc.) does not exclude certain groups or individuals from getting this information. This expense would violate the spirit, if not the letter, of the Public Information Act.

E. Additional environmental information symposiums should be scheduled with modifications:

1. Environmental information users (researchers, etc.) should be encouraged to participate in addition to those here this time.

2. More time should be scheduled for the informal sessions.

We wish to congratulate those who sponsored and planned this meeting. Holding the symposium has done more than anything else to pinpoint and publicize the environmental information problems. We hope this paper answers a part of the challenge extended to us as environmental information users by this symposium.

NEED FOR A NATIONAL ECONOMIC WATER MODEL

Dr. Russell G. Thompson

Professor, University of Houston
Houston, Texas

1. Introduction

Presently, the University of Houston's College of Business Administration and the Cullen College of Engineering are working on a National Science Foundation grant for a two year period funded to approximately $530,000. The grant, "Industrial Economic Models of Water Use and Waste Treatment," is a part of the RANN (Research Applied to National Needs) program sponsored by NSF.

Dr. Russell G. Thompson, Professor of Quantitative Management Science, at the University of Houston and past Director of the Forecast Division of the National Water Commission, is the Principal Investigator for the University of Houston effort. Iowa State University is concurrently working on National Environmental Models and Policy for Agriculture, Land Use and Water Quality under the direction of Dr. Earl O. Heady. A comprehensive picture of national water use should emerge since the Houston effort will stress industrial water use and the Iowa effort will focus on agricultural water use.

The immediate goal of the Houston effort is to develop a basis for measuring the economic demands for water by the leading water-using industries--chemicals, pulp and paper, primary metals, petroleum refining, and electric power generation--so that the effects of variations in policy on the consumptive and disposal uses of water by industry may be evaluated.

In its first stage, the project will provide improved aids for developing broad national and regional policies. Initial emphasis will be directed to evaluating the implications of varying selected national and regional policies. The production functions will be developed accordingly for the most important classes of industrial activity affecting water use. Only the most important substitution possibilities in production and treatment will be modeled initially. This work will be validated with industry assistance; further refinement of the micro models will then be completed.

The long-range goal of the project is to develop a relatively complete national economic model incorporating (1) public resource use, including air, water, and land, and (2) waste generation directly into the economic accounting system. This model would include the demands for the various services rendered by air, water, and land, particularly their use for waste disposal and it would also include the detriments to other users arising from waste discharges. Further, the model would include the costs of supplying public resources for different uses. The model would thus provide a basis for determining the least-cost allocation of resources among conflicting or incompatible demands for different environmental quality standards. The need for a systematic allocation system for water resource use is apparent. By placing the resource allocation problem in a comprehensive economic framework, it would be possible to develop a set of prices so that resources could be allocated by prices.

2. The Importance of Demand

In past studies which forecast water use, the "demands" for water were developed as "requirements"; in other words, the effect of the price of water and other prices on the future use of water was not evaluated. Consequently, policy-making decisions based on these studies must be suspect. Any national water model must incorporate the economic dimensions of water pricing if any bona fide forecasting is to take place.

It is possible to measure the consumptive and disposal demand functions for water for the major water using sectors of the economy. The application of these demand functions is most important because they allow alternative projections of water use to be analyzed by the systematic varying of the factors that influence demand. These demand functions also provide a framework for evaluating whether specific investments are economically feasible and further whether the benefits will justify the costs.

3. Proposal

The Nation clearly needs an economic model of water use in order to evaluate systematically economic efficiency and environmental quality. The weaknesses of the present approach of the Water Resources Council has been pointed out by a number of leading professionals.

Young and Thompson, in a recent paper, have shown how an operational economic model may be developed.[1] This model, which may be applied to the Nation or a region, such as the Delaware Basin, includes water use, the generation of waterborne wastes, and the feedback effects of these wastes on water quality and economic production. Because this model includes the economic tradeoffs that exist between different technologies and different production regions, it provides an accurate determination of the value of water in different uses. It is precisely this determination of values and costs that is the important though often neglected factor in water resource planning today.

Linear programming methods have been used to determine the combination of production activities which will minimize the total cost of resource inputs used to produce a specified amount of final product. For a given bill of final demands, the programming solutions give the combination of production activities that satisfies specified demands at least cost, subject to regional resource constraints. This type of programming model not only shows how to operate production to meet demands most economically, but also gives the total quantities of each input used as a function of the prices of all inputs and gives the marginal cost of meeting one more unit of demand.

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[1] Paper presented at XIX International Meeting, The Institute of Management Sciences, (TIMS), April 7, 1972, Houston, Texas.

In the case of water use, changes in resource quality cause substantial changes in the production efficiency of processes using these resources as inputs. Therefore, it is important to express the input-output coefficients as functions of input quality parameters. However, the possibly negative effect on economic production caused by these feedback effects is not the only way in which environmental quality affects society. Society has developed a demand for environmental quality itself. This demand, whatever considerations it may be based on concerning aesthetics or ecology, may be viewed as a final demand and entered as a requirement in an optimization model in the same way that final demands for goods enter as requirements. Then, as part of the model solution, the marginal costs of meeting these demands may be calculated. Thus the program model must take into account the feedback effect mentioned above and society's demand for environmental quality.

Young and Thompson showed how this could be done by a linearly constrained quadratic program. The Young-Thompson model may be briefly described as follows: The objective is to satisfy the demands for goods and for environmental quality at minimum costs, subject to regional resource availabilities, where the feedback of low water quality on production costs is taken into account. A solution to the model gives the levels of the different production activities, the quantities of inputs used (including water), the quantities and locations of waste discharges, and the actual level of the quality parameters. Most importantly, it will determine the marginal costs of meeting a given demand for environmental quality and the marginal values of each resource in each supply region.

Young and Thompson illustrated how the model could be used to evaluate the effects of increasing ambient water temperature on the generation of electricity. The results showed the amount of electricity produced in each region, the costs of generation, the equilibrium temperature of the lakes, and the marginal cost of imposing the uniform temperature standard.

The Young-Thompson model provides a way to evaluate water development projects on a consistent basis; in particular, it would give the marginal values of water in different regions and the marginal costs of meeting different water quality objectives.

The NSF Projects being directed by Drs. Thompson and Heady, cited above, will provide the data for a national application of the Young-Thompson model. A more limited application in the case of heat discharges (to the water) could be made in the near future for a region such as the Delaware.

Public Perceptions and Attitudes Relating to Environmental Pollution

Dr. C. Michael York
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This forum generated widespread interest and participation as evidenced by the attendance of more than 70 persons--federal executives, local and regional planning agency personnel, university professors, educational specialists, engineering consultants, and members of environmental and citizen groups across the United States.

A major recommendation was the immediate need for bringing together in one package an annotated bibliography of this topical area. This special-interest group agreed to share both formal and informal information relating to "environmental perception" under the direction of Dr. York, the Forum Chairman. Numerous participants expressed the frustration of not having summary data and statements which would be useful in the planning process and in resource management. A mailing list was established to enable the initiation of a periodic newsletter. And, funding will be sought to accomplish the bibliographies--interim versions early in 1973--for a wide range of consumers in the public and private sector.

STATEMENT OF PURPOSE AND NATURE OF THE SCIENCE INFORMATION ASSOCIATION

The Science Information Association (SIA) has been created as a non-profit corporation to provide an organizational vehicle whereby corporations, universities, associations, Government organizations and individuals may be provided direct access through remote terminals to a random access computer stored information bank consisting of a group of major data bases in digital form.

Organizations and individuals are invited to become members of SIA by agreeing to contribute a fixed minimum amount per month for a minimum number of months to obtain telephone line access through computer terminals to the large information banks that will be stored in a computer system operated by the Battelle Memorial Institute Columbus Laboratories (BCL), a not-for-profit corporation. Local dial-up telephone access to the BCL BASIS-70 system is available in over thirty-five major United States cities through the facilities of the Tymshare Corporation at significantly lower costs than normal long-distance telephone rates. The initial program provides bibliographic reference information from the computer to the Association members on the National Technical Information Services (NTIS), the Chemical Abstracts Condensates (CAC) of the Chemical Abstracts Services, and the Engineering Index (EI) data bases.

Thus, by sharing the start-up, update and storage costs, each member receives the benefits of the service at a fraction of the cost as compared to what it would cost if each were to set-up its own service. It is planned that, as the program proceeds, additional data bases in the fields of environment, engineering, physics, law, biology, etc., will be added to the information bank for low additional incremental costs to the members.

The Association also provides its members with optional additional services including: a number of selective dissemination information services (SDI); mailed computer printouts for large bibliographies, etc.; associated microfiche storage, selection and viewing equipment; hard-copy printing equipment; on-line computer terminals; associated systems analysis services; and augumented training programs.

General information concerning the data bases, cost schedules and availability of service are on the other side of this sheet. Additional information can be obtained by contacting Messrs. Cottrell or Landau at the addresses and telephone numbers printed below.

The NTIS data base consists of bibliographic material from 1969 to the present containing about 120,000 records, increasing at about 40,000 records per year. It is now available for experimental retrieval and training purposes at no cost and will be operationally available in

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November, 1972. It describes material in reports prepared for or by the United States Government in all fields of science and technology. Searchable and displayable fields include: accession number; subject and COSATI categories; title words; author (personal or corporate); project, contract and grant numbers; keywords (identifiers and descriptors).

The CAC data base consists of bibliographic material from approximately 1.2 million records from 1969 to the present and will be available for training purposes in November, 1972, and operationally available in December, 1972. The CAC contains bibliographic materials relating to publications in all fields of chemistry and contains fields similer to those of NTIS.

The Engineering Index consists of the bibliographic material from approximately 200,000 records from 1969 to the present and contains material pertaining to all engineering fields from over 3,500 sources of engineering literature in over 12,000 main and sub-headings. It will be available for training purposes in December, 1972, and operationally available in January, 1973, and contains fields similar to those of NTIS.

Following are the cost schedules available:

1. Initial (and annual) membership fee: Individuals, $35; Corporations, $100-$500, depending on size; Government Agencies, Universities, Associations, Non-Profit Groups, etc.,$100.

2. Connect Time Rates:
   NTIS or EI:
   Option A = $1.75/minute for first 10 hours per month; $.50 per minute thereafter; minimum contract, $1050/month (10 hours) for six or more months.
   Option B = $2.00/minute for first 10 hours per month; $.75 per minute thereafter; minimum contract, $360 per month (3 Hours) for 6 or more months.
   CAC
   Option A = $2.00/minute for first 10 hours per month; $.50/minute thereafter; minimum contract, $1200/month (10 hours) for 6 or more months.
   Option B = $2.50/minute for first 10 hours per month; $1.00/minute thereafter; minimum contract, $450/month (3 hours) for 6 or more months.

Note: The above rates assume that each member will provide his own 10-30 characters/second terminal and pay the telephone line costs. SIA can, upon request, supply a variety of terminals (sale, rent or lease) and arrange for a billing system for the telephone line costs or the use of the Tymshare facilities. Based on the above rates, the connect time costs for the typical search (lasting around 10 minutes) would range from $5.00 to $25.00 each.

A subscriber of either Option A or B for any data base has the right of access to the other data bases at Option B first 10-hour rates. The data bases in the system are available at all times from 9:00 A.M. to 12 midnight Eastern time on week days and from 8:00 A.M. to 5:00 P.M. Eastern time on Saturdays. The system is extremely user-oriented, using Boolean logic for browsing and narrowing the search iteratively to only those document references that are relevant. Each member user is provided a six hour training course at no cost.

Integrity in Reporting

Robert W. Mason
Forum Leader

The forum was called together because the forum leader was concerned with the increasingly poor quality of reports in the scientific literature. Several examples of such reports over the past 10 years were presented. Most of these reports were honest but contained inappropriate or inadequate uses of otherwise good data. One example, however, was one of misquoting and misinterpretation of previous reports coupled with arithmetic error which led to false conclusions.

The forum concensus was that some important instances of carelessness and error in scientific papers does exist. In most cases this carelessness would be corrected by reviewers in the prepublication stage performing a thorough, constructive job.

There is no governing body to monitor scientific publications and no mechanism for penalizing either journals or authors for carelessness, error or even dishonesty.

It is the publishing journals responsibility to both the author and the reader to select adequate reviewers for each paper submitted to it and to not publish until the majority of unfavorable comments are resolved.

It is recommended that the reviewers in every case should be from several disciplines to ensure broad perspectives and adequate reviews.

All reviewers names, disciplines and each final opinion as favorable or unfavorable should be appended to each article. This will place responsibility on the reviewer as well as provide a mechanism for correspondence, particularly on points of contention.

Because much foreign information is pertinent to a subject, it is recommended that appropriate foreign reviewers be included.

There will be a need for competent review of existing literature as it passes from the discipline in which it was originally published to another discipline in which it will be used. An example is the increasing use of scientific literature by the law profession in environmental law.

In the future, scientists more and more are going to be producing data for people who are unfamiliar with the subject. Therefor scientists have now a great responsibility as individuals and as a body to précis the meaning of the information they publish.

The Environmental Protection Agency can do much to ensure quality in publication by selecting at random articles which it abstracts for a thorough review by a board of competent persons in a variety of disciplines. Whenever carelessness or inadequacy or dishonesty is found which should have been detected in a reasonably sound prepublication review, this should be called to the attention of the publisher, the author and made a matter of public notice.

Because of the vastness of the scientific literature its importance and the ineffectiveness of self-discipline consumer protection legislation in the area of reporting is needed. As one speaker pointed out freedom is a grant of responsibility and freedom of the press is always abused by careless, irresponsible reporting.